

IMPERIAL COUNTY AIR POLLUTION CONTROL DISTRICT



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August 18, 2014
Exceptional Event Documentation
For the Imperial County PM₁₀ Nonattainment Area

FINAL REPORT
September 4, 2018

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ACRONYM DESCRIPTIONS

AOD	Aerosol Optical Depth
AQI	Air Quality Index
AQS	Air Quality System
BACM	Best Available Control Measures
BAM 1020	Beta Attenuation Monitor Model 1020
BLM	United States Bureau of Land Management
BP	United States Border Patrol
CAA	Clean Air Act
CARB	California Air Resources Board
CMP	Conservation Management Practice
DCP	Dust Control Plan
DPR	California Department of Parks and Recreation
EER	Exceptional Events Rule
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GOES-W/E	Geostationary Operational Environmental Satellite (West/East)
HC	Historical Concentrations
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
ICAPCD	Imperial County Air Pollution Control District
INPEE	Initial Notification of a Potential Exceptional Event
ITCZ	Inter Tropical Convergence Zone
KBLH	Blythe Airport
KCZZ	Campo Airport
KIPL	Imperial County Airport
KNJK	El Centro Naval Air Station
KNYL/MCAS	Yuma Marine Corps Air Station
KPSP/PSP	Palm Springs International Airport
KTRM	Jacqueline Cochran Regional Airport (aka Desert Resorts Rgnl Airport)
LST	Local Standard Time
MMML/MXL	Mexicali, Mexico Airport
MODIS	Moderate Resolution Imaging Spectroradiometer
MPH	Miles Per Hour
MST	Mountain Standard Time
NAAQS	National Ambient Air Quality Standard
NCAR	National Center for Atmospheric Research
NCEI	National Centers for Environmental Information
NEAP	Natural Events Action Plan
NEXRAD	Next-Generation Radar
NOAA	National Oceanic and Atmospheric Administration
nRCP	Not Reasonably Controllable or Preventable
NWS	National Weather Service

PDT	Pacific Daylight Time
PM ₁₀	Particulate Matter less than 10 microns
PM _{2.5}	Particulate Matter less than 2.5 microns
PST	Pacific Standard Time
QA/QC	Quality Assured and Quality Controlled
QCLCD	Quality Controlled Local Climatology Data
RACM	Reasonable Available Control Measure
RAWS	Remote Automated Weather Station
SIP	State Implementation Plan
SLAMS	State Local Ambient Air Monitoring Station
SMP	Smoke Management Plan
SSI	Size-Selective Inlet
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTC	Coordinated Universal Time
WRCC	Western Regional Climate Center

I Introduction

On August 18, 2014, the State and Local Ambient Air Monitoring Station (SLAMS) located in Niland (AQS Site Code 060254004), California measured an exceedance of the National Ambient Air Quality Standard (NAAQS). The Federal Equivalent Method (FEM), Beta Attenuation Monitor Model 1020 (BAM 1020) measured a (midnight to midnight) 24-hr average Particulate Matter less than 10 microns (PM₁₀) concentration of 161 µg/m³. PM₁₀ 24-hr measurements measured above the 150 µg/m³ are exceedances of the NAAQS. The SLAMS in Niland was the only station in Imperial County to measure an exceedance of the PM₁₀ NAAQS on August 18, 2014.

TABLE 1-1
CONCENTRATIONS OF PM₁₀ ON AUGUST 18, 2014

DATE	MONITORING SITE	AQS ID	POC(s)	HOURS	24-HOUR CONCENTRATION µg/m ³	PM ₁₀ NAAQS µg/m ³
8/18/2014	Niland	06-025-4004	3	23	161	150
8/18/2014	Brawley	06-025-0007	3	22	103	150

All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted¹
August 18, 2014 was not a scheduled sampling day

The Imperial County Air Pollution Control District (ICAPCD) has been submitting PM₁₀ data from Federal Reference Method (FRM) Size-Selective Inlet (SSI) instruments since 1986 into the United States Environmental Protection Agency's (USEPA) Air Quality System (AQS). Prior to 2013 all continuous measured PM₁₀ data was non-regulatory, thus measured in local conditions. However, by 2013 ICAPCD began formally submitting continuous FEM PM₁₀ data from BAM 1020's into the USEPA managed AQS. Because regulatory consideration of reported data must be in standard conditions, as required by USEPA, all continuous PM₁₀ data since 2013 is regulatory. On August 18, 2014, the Niland monitor was impacted by elevated particulate matter caused by the entrainment of fugitive windblown dust from high winds associated with outflow from thunderstorms originating from the extreme northwest within Sonora Mexico. As the thunderstorms moved west toward San Diego County, the outflows caused blowing dust and sand affecting Imperial County on August 18, 2014.²

This report demonstrates that a naturally occurring event caused an exceedance observed on August 18, 2014, which elevated particulate matter and affected air quality. The report provides concentration-to-concentration monitoring site analyses supporting a clear causal relationship between the event and the monitored exceedance and provides an analysis supporting the not reasonably controllable or preventable (nRCP) criteria. Furthermore, the report provides

¹ According to the National Institute of Standards and Technology (NIST) Time and Frequency Division the designation of the time of day for specific time zones are qualified by using the term "standard time" or "daylight time". For year-round use, the designation can be left off inferring "local time" daylight or standard whichever is present. For 2014, Pacific Daylight Time (PDT) is March 9 through November 2. <https://www.nist.gov/pml/time-and-frequency-division/local-time-faq#intl>

² Area Forecast Discussion National Weather Service San Diego CA, 240 AM PST (340 AM PDT), 820 AM PST (920 AM PDT), 100 PM PST (200 PM PDT) and Phoenix AZ, 420 AM PST (520 AM MST), Monday, August 18, 2014

information that the exceedance would not have occurred without the transport of fugitive windblown dust from outlying deserts and mountains within the Sonoran Desert. The document further substantiates the request by the ICAPCD to exclude PM₁₀ 24-hour NAAQS exceedance of 161 µg/m³ (**Table 1-1**) as an exceptional event. This demonstration substantiates that this event meets the definition of the USEPA Regulation for the Treatment of Data Influenced by Exceptional Events (EER)³.

I.1 Demonstration Contents

Section II - Describes the August 18, 2014 event as it occurred in California and into Imperial County, providing background information of the exceptional event and explaining how the event affected air quality. Overall, this section provides the evidence that the event was a natural event.

Section III - Using time-series graphs, summaries and historical concentration comparisons of the Niland station, this section discusses and establishes how the August 18, 2014 event affected air quality demonstrating that a clear causal relationship exists between the event and the monitored exceedance. It is perhaps of some value to mention that the time-series graphs include PM₁₀ data measured in both local conditions and standard conditions. Measured PM₁₀ continuous data prior to 2013 is in local conditions, all other data is in standard conditions. The concentration difference between local and standard conditions has an insignificant impact on any data analysis. Overall, this section provides the evidence that human activity played little or no direct causal role in the August 18, 2014 event and its resulting emissions defining the event as a “natural event”.⁴

Section IV - Provides evidence that the event of August 18, 2014 was not reasonably controllable or preventable despite the full enforcement and implementation of Best Available Control Measures (BACM).

Section V - Brings together the evidence presented within this report to show that the exceptional event affected air quality; that the event was not reasonably controllable or preventable; that there was a clear causal relationship between the event and the exceedance, and that the event was a natural event.

I.2 Requirement of the Exceptional Event Rule

The above sections combined comprise the technical requirements described under the Exceptional Events Rule (EER) under 40 CFR §50.14(c)(3)(iv). However, in order for the USEPA to concur with flagged air quality monitoring data, there are additional non-technical requirements.

³ "Treatment of Data Influenced by Exceptional Events; Final Guidance", 81 FR 68216, October 2, 2016

⁴ Title 40 Code of Federal Regulations part 50: §50.1(k) Natural event means an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions.

I.2.a Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

The ICAPCD provided the National Weather Service (NWS) notifications via the ICAPCD's webpage that an early season Pacific low-pressure system would approach the region adding to the existing moisture levels. With levels of moisture increasing, the anticipated increased southerly flow could potentially cause thunderstorm activity. According to the San Diego NWS office, outflow from thunderstorms overnight on August 17, 2014, caused blowing dust and sand.⁵ Because of the potential for suspended particles and poor air quality, the ICAPCD issued a "No Burn" day in Imperial County. In addition, the ICAPCD posted the notices issued by the National Weather Service (NWS) warning of thunderstorms and gusty winds up to 40 mph. **Appendix A** contains copies of pertinent notices to the August 18, 2014 event.

I.2.b Initial Notification of Potential Exceptional Event (INPEE) (40 CFR §50.14(c)(2))

States are required under federal regulation to submit measured ambient air quality data into the AQS. AQS is the federal repository of Quality Assured and Quality Controlled (QA/QC) ambient air data used for regulatory purposes. When States intend to request the exclusion of one or more exceedances of a NAAQS as an exceptional event a notification to the Administrator is required. Notification occurs when an agency submits a request, which includes an initial event description, for flagging data in AQS.

On October 3, 2016, the US EPA promulgated revisions to the Exceptional Events rule, which included the requirement of an "Initial Notification of Potential Exceptional Event" (INPEE) process. This revised INPEE process requires communication between the US EPA regional office and the State, prior to the development of a demonstration. The intent of the INPEE process is twofold: to determine whether identified data may affect a regulatory decision and whether a State should develop/submit an EE Demonstration.

The ICAPCD made a written request to the California Air Resources Board (CARB) to place preliminary flags on SLAMS measured concentrations from the Niland monitor. The request dated May 28, 2015 requested an initial flag for the measurement from the BAM 1020 in Niland of 161 µg/m³. Subsequently, after submittal of the request, CARB received corrected FEM data measurements in standard conditions, originally submitted in local conditions. USEPA requires data in standard conditions when making regulatory decisions. **Table 1-1** above provides the PM₁₀ measured concentrations for all monitors in Imperial County for Niland. The difference in concentrations between local and standard has an insignificant impact on any data analysis. The submitted request included a brief description of the meteorological conditions for August 18, 2014 indicating that a potential natural event occurred.

⁵ Area Forecast Discussion National Weather Service San Diego CA 240 AM PST (340 AM PDT), Monday, August 18, 2014

I.2.c Documentation that the public comment process was followed for the event demonstration that was flagged for exclusion (40 CFR §50.14(c)(3)(v))

The ICAPCD posted, for a 30-day public review, a draft version of this demonstration on the ICAPCD webpage and published a notice of availability in the Imperial Valley Press on April 20, 2018. The published notice invited comments by the public regarding the request, by the ICAPCD, to exclude the measured concentrations of 161 $\mu\text{g}/\text{m}^3$, which occurred on August 18, 2014 in Niland. The final closing date for comments was May 21, 2018. **Appendix A** contains a copy of the public notice affidavit along with any comments received by the ICAPCD for submittal as part of the demonstration (40 CFR §50.14(c)(3)(v)).

I.2.d Documentation submittal supporting an Exceptional Event Flag (40 CFR §50.14(c)(3)(i))

States that have flagged data as a result of an exceptional event and who have requested an exclusion of said flagged data are required to submit a demonstration that justifies the data exclusion to the USEPA in accordance with the due date established by USEPA during the INPEE process (40 CFR §50.14(c)(2)). Currently, bi-weekly meetings between USEPA, CARB and Imperial County continue to discuss any potential documentation of events.

The ICAPCD, after the close of the comment period and after consideration of the comments will submit this demonstration along with all required elements, including received comments and responses to USEPA Region 9 in San Francisco, California. The submittal of the August 18, 2014 demonstration will have a regulatory impact upon the development and ultimate submittal of the PM_{10} State Implementation Plan for Imperial County in 2018.

I.2.e Necessary demonstration to justify an exclusion of data under (40 CFR §50.14(c)(3)(iv))

- A This demonstration provides evidence that the event, as it occurred on August 18, 2014, satisfies the definition in 40 CFR §50.1(j) and (k) for an exceptional event.
 - a The event created the meteorological conditions that entrained emissions and caused the exceedance.
 - b The event clearly “affects air quality” such that there is the existence of a clear causal relationship between the event and the exceedance.
 - c Analysis demonstrates that the event-influenced concentrations compared to concentrations at the same monitor at other times supports the clear causal relationship.
 - d The event “is not reasonably controllable and not reasonably preventable.”
 - e The event is “caused by human activity that is unlikely to recur at a particular location or [is] a natural event.”
 - f The event is a “natural event” where human activity played little or no direct causal role.

- B This demonstration provides evidence that the exceptional event affected air quality in Imperial County by demonstrating a clear causal relationship between the event and the measured concentration in Niland.
- C This demonstration provides evidence of the measured concentrations to concentrations at the same monitor at other times supporting the clear causal relationship between the event and the affected monitor.

II August 18, 2014 Conceptual Model

This section provides a summary description of the meteorological and air quality conditions under which the August 18, 2014 event unfolded in Imperial County. The subsection elements include

- » A description and map of the geographic setting of the air quality and meteorological monitors
- » A description of Imperial County's climate
- » An overall description of meteorological and air quality conditions on the event day.

II.1 Geographic Setting and Monitor Locations

According to the United States Census Bureau, Imperial County has a total area of 4,482 square miles of which 4,177 square miles is land and 305 square miles is water. Much of Imperial County is below sea level and is part of the Colorado Desert an extension of the larger Sonoran Desert (Figure 2-1). The Colorado Desert not only includes Imperial County but a portion of San Diego County.



Fig 2-1: 1997 California Environmental Resources Evaluation System. According to the United States Geological Survey (USGS) Western Ecological Research Center, the Colorado Desert bioregion is part of the bigger Sonoran Desert Bioregion, which includes the Colorado Desert and Upper Sonoran Desert sections of California and Arizona, and a portion of the Chihuahuan Basin and Range Section in Arizona and New Mexico (Forest Service 1994)

A notable feature in Imperial County is the Salton Sea, which is at approximately 235 feet below sea level. The Chocolate Mountains are located east of the Salton Sea and extend in a northwest-southeast direction for approximately 60 miles (**Figure 2-2**). In this region, the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect the northern-most extensions of the East Pacific rise. Consequently, the region is subject to earthquakes and the crust is being stretched, resulting in a sinking of the terrain over time.

FIGURE 2-2
SURROUNDING AREAS OF THE SALTON SEA



Fig 2-2: Image courtesy of the Image Science and Analysis Laboratory NASA Johnson Space Center, Houston Texas

All of the seven incorporated cities, including the unincorporated township of Niland, are surrounded by agricultural fields to the north, east, west and south (**Figure 2-6**). Together, the incorporated cities, including Niland and the agricultural fields make what is known as the Imperial Valley. Surrounding the Imperial Valley are desert areas found on the eastern and western portions of Imperial County.

The desert area, found within the western portion of Imperial County is of note because of its border with San Diego County. From west to east, San Diego County stretches from the Pacific Ocean to its boundary with Imperial County. San Diego County has a varied topography. On its western side is 70 miles (110 km) of coastline. Most of San Diego between the coast and the Laguna Mountains consists of hills, mesas, and small canyons. Snow-capped (in winter)

mountains rise to the northeast, with the Sonoran Desert to the far east. Cleveland National Forest is spread across the central portion of the county, while the Anza-Borrego Desert State Park occupies most of the northeast. The southeastern portion of San Diego County is comprised of distinctive peninsular mountain ranges. The mountains and deserts of San Diego comprise the eastern two-thirds of San Diego County and are primarily undeveloped back county with a native plant community known as chaparral. Of the nine major mountain ranges within San Diego County, the In-Ko-Pah Mountains and the Jacumba Mountains border Mexico and Imperial County.

Both mountain ranges provide the distinctive weathered dramatic piles of residual boulders that can be seen while driving Interstate 8 from Imperial County through Devil's Canyon and In-Ko-Pah Gorge. Interstate 8 runs along the US border with Mexico from San Diego's Mission Bay to just southeast of Casa Grande Arizona.

FIGURE 2-3
JACUMBA PEAK



Fig 2-3: The Jacumba Mountains reach an elevation of 4,512 feet (1,375 m) at Jacumba Peak, near the southern end of the chain. Source: Wikipedia at https://en.wikipedia.org/wiki/Jacumba_Mountains

Northwest and northeast of the Jacumba Mountains is the Tierra Blanca Mountains, the Sawtooth Mountains and Anza-Borrego Desert State Park. Within the mountain ranges and the Anza-Borrego Desert State Park, there exists the Vallecito Mountains, the Carrizo Badlands, the Carrizo Impact Area, Coyote Mountains and the Volcanic Hills to name of few. Characteristically, these areas all have erosion that has occurred over time that extends from the Santa Rosa Mountains into northern Baja California in Mexico. For example, the Coyote Mountains consists of sand dunes left over from the ancient inland Sea of Cortez. Much of the terrain is still loose dirt, interspersed with sandstone and occasional quartz veins. The nearest community to the Coyote Mountain range is the community of Ocotillo. Of interest are the fossilized and hollowed out sand dunes that produce wind caves.

FIGURE 2-4
ANZA-BORREGO DESERT STATE PARK
CARRIZO BADLANDS



Fig 2-4: View southwest across the Carrizo Badlands from the Wind Caves in Anza-Borrego Desert State Park. Source: Wikipedia at https://en.wikipedia.org/wiki/Carrizo_Badlands

The Carrizo Badlands, which includes the Carrizo Impact Area used by the US Navy as an air-to-ground bombing range during World War II and the Korean War, lies within the Anza-Borrego Desert State Park. The Anza-Borrego Desert State Park is located within the Colorado Desert, is the largest state park in California occupying eastern San Diego County, reaching into Imperial and Riverside counties. The two communities within Anza-Borrego Desert State Park are Borrego Springs and Shelter Valley.

The Anza-Borrego Desert State Park lies in a unique geologic setting along the western margin of the Salton Trough. The area extends north from the Gulf of California to San Geronio Pass and from the eastern rim of the Peninsular Ranges eastward to the San Andreas Fault zone along the far side of the Coachella Valley. The Anza-Borrego region changed gradually over time from intermittently being fed by the Colorado River Delta to dry lakes and erosion from the surrounding mountain ranges. The area located within the southeastern and northeastern section of San Diego County is a source of entrained fugitive dust emissions that impact Imperial County when westerly winds funnel through the unique landforms causing in some cases wind tunnels that cause increases in wind speeds.

Historical observations have indicated that the desert slopes and mountains of San Diego are a source of fugitive emissions along with those deserts located to the east and west of Imperial County, which extend into Mexico (Sonoran Desert, **Figure 2-7**). Combined, the desert areas and mountains of San Diego and the desert areas that extend into Mexico are sources of dust emissions, which affect the Imperial County during high wind events.

FIGURE 2-5
ANZA-BORREGO DESERT STATE PARK
DESERT VIEW FROM FONT'S POINT



Fig 2-5: Desert view from Font's Point. Source: Font's Point Anza-Borrego Photographed by and copyright of (c) David Corby; Wikipedia at https://en.wikipedia.org/wiki/Anza-Borrego_Desert_State_Park

A satellite map of the Imperial Valley region, showing the Colorado River forming the border between California, USA (top) and Mexico (bottom). The map highlights several agricultural areas in orange, including the Salton River delta, the Colorado River delta, and various smaller irrigated plots. Labels on the map include Niland, Calipatria, Westmorland, Brawley, Imperial, Holtville, El Centro, Calexico, and Mexicali, Mexico. A red line outlines the border between the two countries.

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FIGURE 2-7
DESERTS IN CALIFORNIA, YUMA AND MEXICO

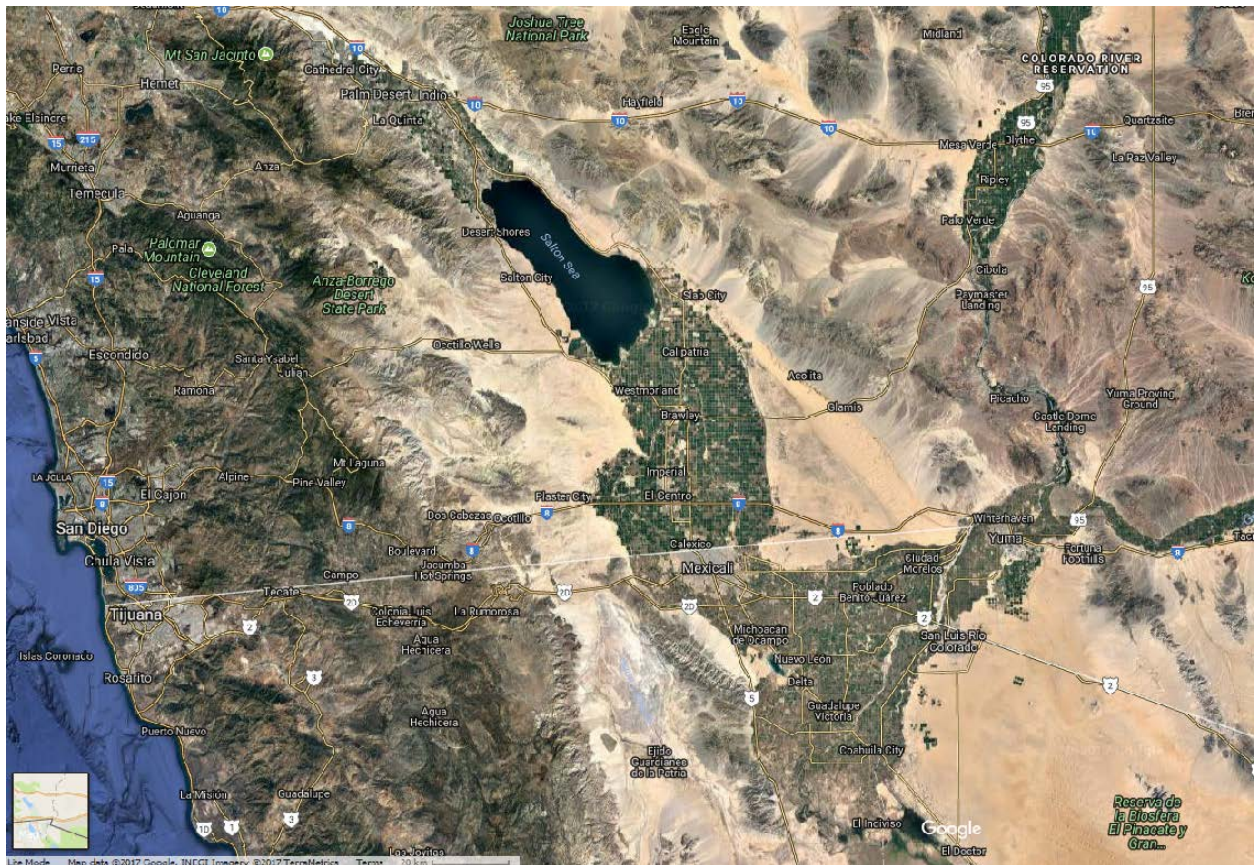


Fig 2-7: Depicts the Sonoran Desert as it extends from Mexico into Imperial County.

Source: Google Earth Terra Matrics

The air quality and meteorological monitoring stations used in this demonstration are shown in **Figure 2-8**. Of the five SLAMS within Imperial County, four stations measure both meteorological and air quality data. These SLAMS are located in Calexico, El Centro, Westmorland, and Niland; the station located in Brawley only measures air quality. Other air monitoring stations measuring air quality and meteorological data used for this demonstration include stations in eastern Riverside County, southeastern San Diego County and southwestern Arizona (Yuma County) (**Figure 2-8 and Table 2-1**).

As mentioned above, the PM₁₀ exceedance on August 18, 2014, occurred at the Niland station. The Brawley, Niland and Westmorland stations are regarded as the “northern” monitoring sites within the Imperial County air monitoring network. In order to properly analyze the contributions from meteorological conditions occurring on August 18, 2014, other meteorological sites were used in this demonstration which include airports in eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), Imperial County, and other sites relevant to the wind event, such as within northern Mexico. (**Figure 2-8 and Appendix B**).

FIGURE 2-8
MONITORING SITES IN AND AROUND IMPERIAL COUNTY

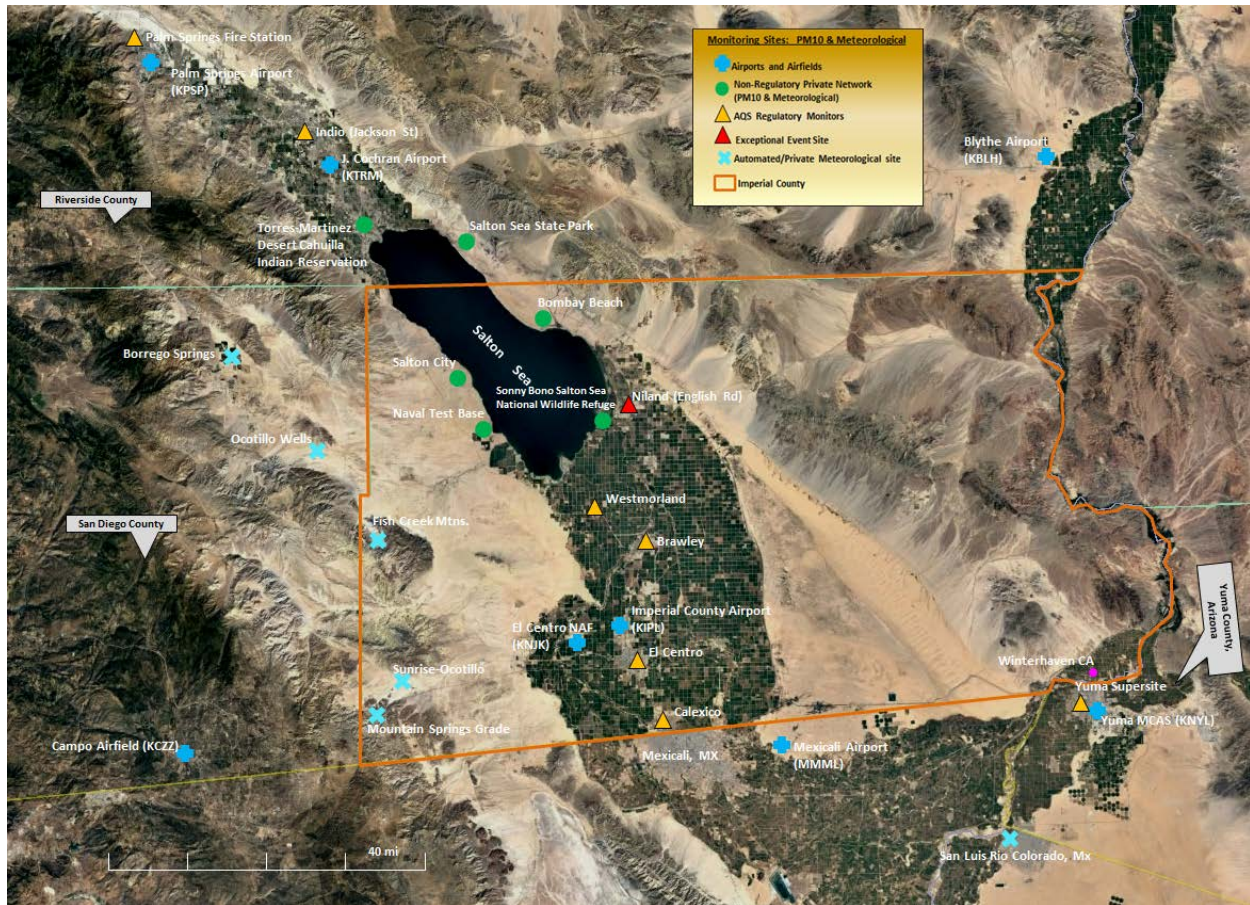


Fig 2-8: Depicts a select group of meteorological and PM₁₀ monitoring sites in Imperial County, eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), and northern Mexico. The image provides the location of potential sites used to gather data in support an Exceptional Event Demonstration. Source: Google Earth

In addition to meteorological sites, there are non-regulatory PM₁₀ sites located around the Salton Sea that maybe referenced as an aid to help the reader understand the direction and velocity of winds that affect Imperial County. Unless, otherwise specifically indicated concentration references do not imply emissions from the surrounding playa of the Salton Sea. Three sites, in specific, are the Salton City air monitoring station, the Naval Test Base air monitoring station and the Sonny Bono air monitoring station. These privately owned stations are non-regulatory (**Figures 2-9 to 2-12**). The Salton City station is located 33.27275°N latitude and 115.90062°W longitude, on the western edge of the Salton Sea (**Figure 2-9**). The station abuts a water reservoir along the Salton Sea with surrounding chaparral vegetation and unpaved open areas and roads. The Naval Test Base station is located 33.16923°N latitude and 115.85593°W longitude, on the southwestern edge of the Salton Sea (**Figure 2-11**). The station sits on an abandoned US Military site, still owned by the Department of Defense. Unlike the Salton City station, light chaparral vegetation and sandy open dune areas surround the Naval Test Base station. Directly to the west

of the station is an orchard. The Sonny Bono station is located 33.17638°N latitude and 115.62310°W longitude, on the southern portion of the Salton Sea within the Sonny Bono Salton Sea Wildlife Refuge. The Sonny Bono Salton Sea National Wildlife Refuge is 40 miles north of the Mexican border at the southern end of the Salton Sea within the Sonoran Desert. The Refuge has two separate managed units, 18 miles apart. Each unit contains wetland habitats, farm fields, and tree rows. The land of the Salton Sea Refuge is flat, except for Rock Hill, a small, inactive volcano, located near Refuge Headquarters. Bordering the Refuge is the Salton Sea on the north and farmlands on the east, south, and west.

FIGURE 2-9
SALTON CITY AIR MONITORING STATION

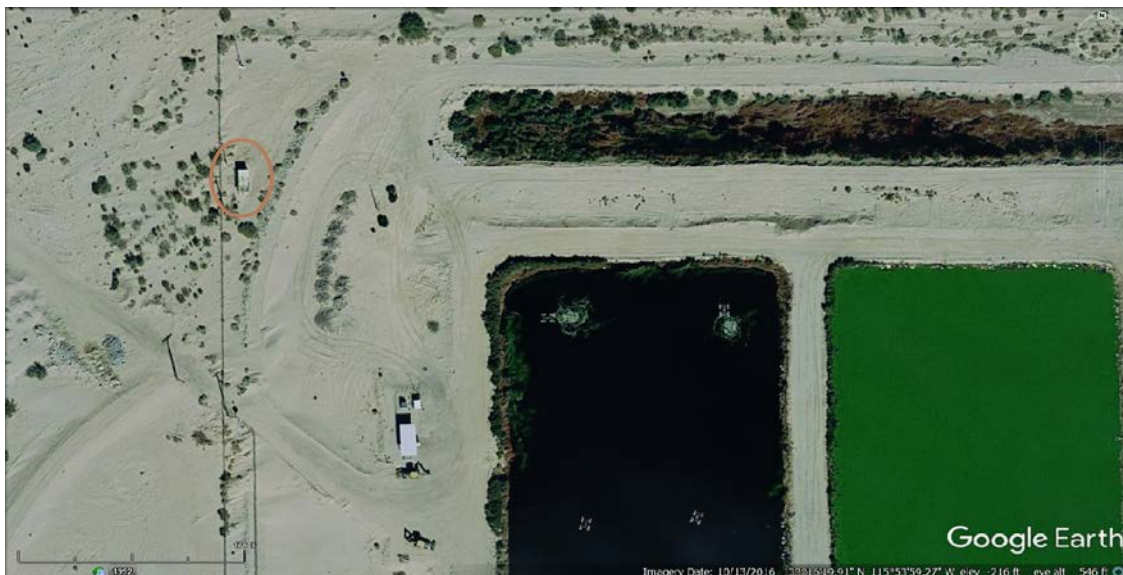


Fig 2-9: Depicts the Salton City air monitoring (circled) site operated by a private entity. View site photos at the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-10
SALTON CITY AIR MONITORING STATION
WEST



Fig 2-10: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe.
https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-11
NAVAL TEST BASE AIR MONITORING STATION



Fig 2-11: Depicts the Naval Test Base air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13603&date=17

FIGURE 2-12
NAVAL TEST BASE AIR MONITORING STATION
WEST



Fig 2-12: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe.
https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-13
SONNY BONO AIR MONITORING STATION



Fig 2-13: Depicts the Sonny Bono air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at
https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-14
SONNY BONO SALTON SEA NATIONAL WILDLIFE REFUGE

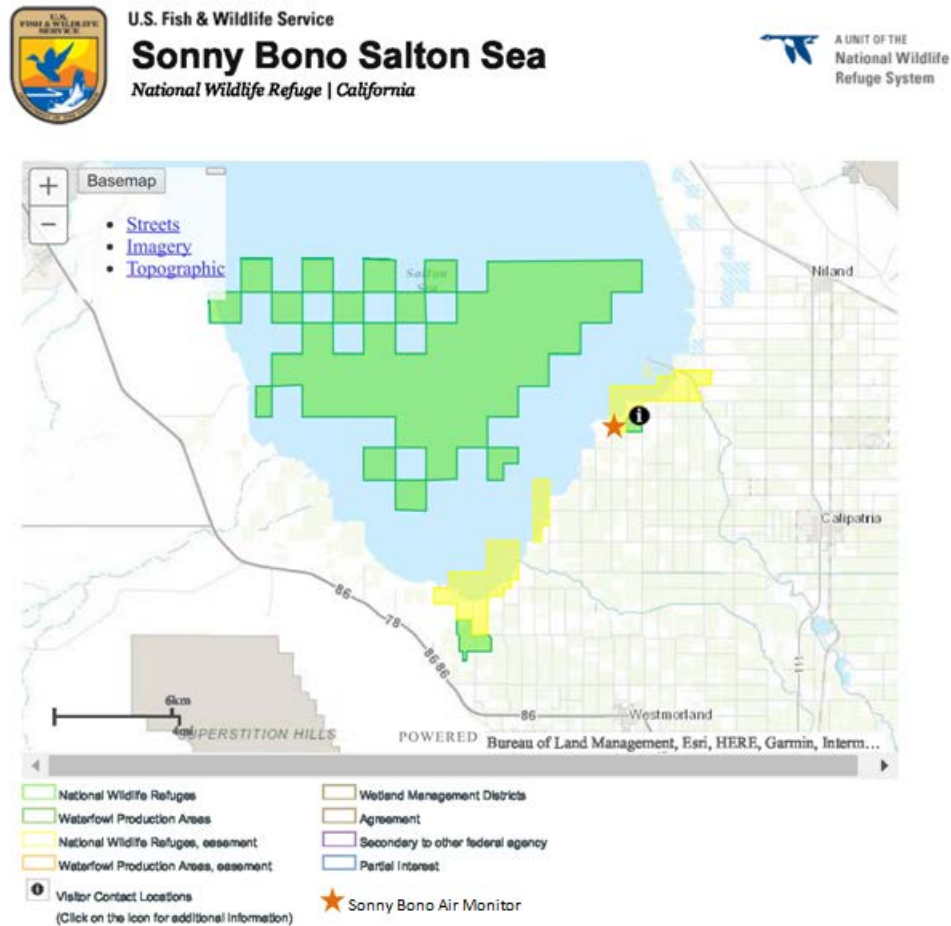


Fig 2-14: The Sonny Bono Wildlife Refuge has about 2,000 acres that are farmed and managed for wetlands. In 1998, the Refuge was renamed after Congressman Sonny Bono, who helped inform the U.S. Congress of the environmental issues facing the Salton Sea as well as acquiring funding for this Refuge to help it respond to avian disease outbreaks and other habitat challenges at the Salton Sea. Source: https://www.fws.gov/refuge/Sonny_Bono_Salton_Sea/about.html

TABLE 2-1
MONITORING SITES IN IMPERIAL COUNTY, RIVERSIDE COUNTY AND ARIZONA
AUGUST 18, 2014

Monitor Site Name	*Operator	Monitor Type	AQS ID	AQS PARAMETER CODE	ARB Site Number	Elevation (meters)	24-hr PM ₁₀ (ug/m ³) Avg***	1-hr PM ₁₀ (ug/m ³) Max	**Time of Max Reading	Max Wind Speed (mph)	**Time of Max Wind Speed
IMPERIAL COUNTY											
Brawley-Main Street #2	ICAPCD	Hi-Vol Gravimetric	06-025-0007	(81102)	13701	-15	-	-	-	-	-
		BAM 1020					103.4	597.5	200		
Calexico-Ethel Street	CARB	Hi-Vol Gravimetric	06-025-0005	(81102)	13698	3	-	-	-	17.4	300
El Centro-9th Street	ICAPCD	Hi-Vol Gravimetric	06-025-1003	(81102)	13694	9	-	-	-	13.5	300
Niland-English Road	ICAPCD	Hi-Vol Gravimetric	06-025-4004	(81102)	13997	-57	-	-	-	18	300
		BAM 1020					162.4	799	100		
Westmorland	ICAPCD	Hi-Vol Gravimetric	06-025-4003	(81102)	13697	-43	-	-	-	-	-
RIVERSIDE COUNTY											
Palm Springs Fire Station	SCAQMD	TEOM	06-065-5001	(81102)	33137	174	313.3	841	600	-	-
Indio (Jackson St.)	SCAQMD	TEOM	06-065-2002	(81102)	33157	1	73.5	495	000	-	-
ARIZONA – YUMA											
Yuma Supersite	ADEQ	TEOM	04-027-8011	(81102)	N/A	60	181.7	1783	100	-	-

*CARB = California Air Resources Board

*ICAPCD = Air Pollution Control District, Imperial County

*SCAQMD = South Coast Air Management Quality District

*ADEQ = Arizona Department of Environmental Quality

**Time represents the actual time/hour of the measurement in question according to the zone time (PST unless otherwise noted)

II.2 Climate

As mentioned above, Imperial County is part of the Colorado Desert, which is a subdivision of the larger Sonoran Desert (**Figure 2-15**) encompassing approximately 7 million acres (28,000 km²). The desert area encompasses Imperial County and includes parts of San Diego County, Riverside County, and a small part of San Bernardino County.

FIGURE 2-15
SONORAN DESERT REGION



Fig 2-15: Depicts the magnitude of the region known as the Sonoran Desert. Source: Arizona-Sonora Desert Museum at <http://desertmuseum.org/center/map.php>

The majority of the Colorado Desert lies at a relatively low elevation, below 1,000 feet (300 m), with the lowest point of the desert floor at 275 feet (84 m) below sea level at the Salton Sea. Although the highest peaks of the Peninsular Range reach elevations of nearly 10,000 feet (3,000 m), most of the region's mountains do not exceed 3,000 feet (910 m).

In the Colorado Desert (Imperial County), the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect to the northern-most extensions of the East Pacific Rise. Consequently, the region is subject to earthquakes, and the crust is being stretched, resulting in a sinking of the terrain over time.

The Colorado Desert's climate distinguishes it from other deserts. The region experiences greater summer daytime temperatures than higher-elevation deserts and almost never experiences frost. In addition, the Colorado Desert experiences two rainy seasons per year (in the winter and late summer), especially toward the southern portion of the region which includes a portion of San Diego County. The Colorado Desert portion of San Diego County receives the least amount of precipitation. Borrego Springs, the largest population center within the San Diego desert region averages 5 inches of rain with a high evaporation rate. By contrast, the more northerly Mojave Desert usually has only winter rains.

The west coast Peninsular Ranges, or other west ranges, of Southern California—northern Baja California, block most eastern Pacific coastal air and rains, producing an arid climate. Other short or longer-term weather events can move in from the Gulf of California to the south, and are often active in the summer monsoons. These include remnants of Pacific hurricanes, storms from the southern tropical jet stream, and the northern Inter Tropical Convergence Zone (ITCZ).

The arid nature of the region is demonstrated when historical annual average precipitation levels in Imperial County averages 3.11" (**Figure 2-16**). During the 12-month period prior to August 18, 2014, Imperial County recorded total annual precipitation of 3.03 inches. Such arid conditions, as those preceding the event, result in soils that are particularly susceptible to particulate suspension by the elevated gusty winds.

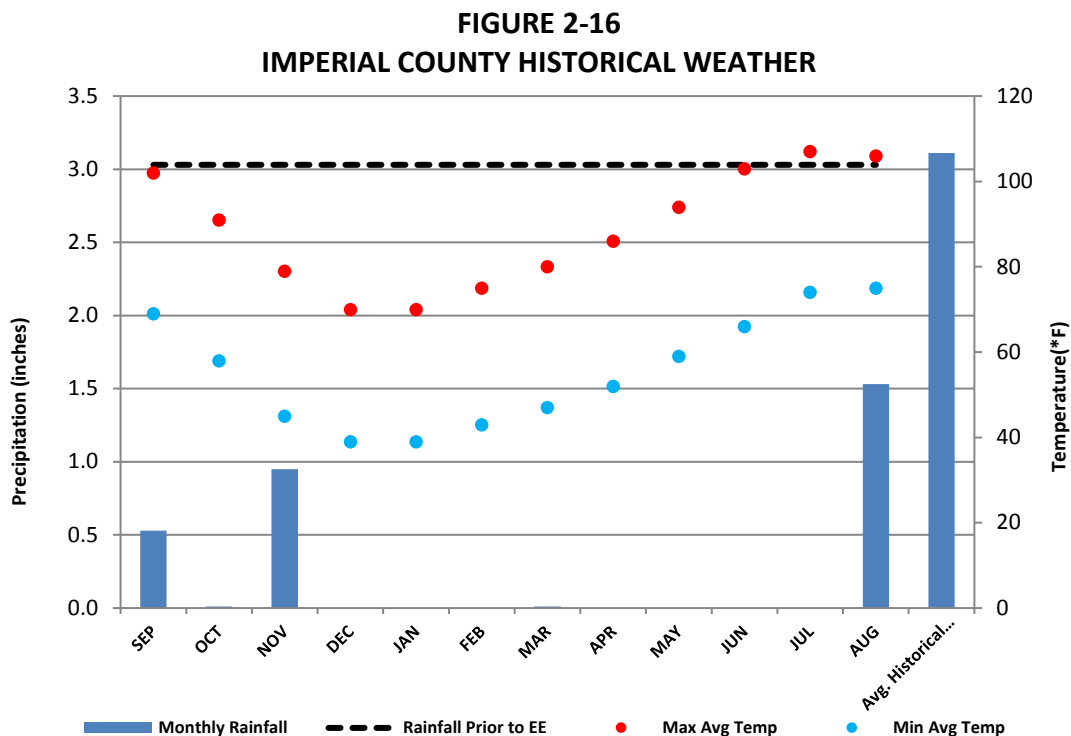


Fig 2-16: Prior to August 18, 2014, the region suffered low total annual precipitation of 3.03 inches. Average annual precipitation is 3.11 inches. Meteorological data courtesy of Western Regional Climate Center (WRCC) and Weather Underground <http://www.wrcc.dri.edu/cgi-bin/climain.pl?ca2713>

The NWS explains that the speed of any wind resulting from a weather system is directly proportional to the change in air pressure, called a pressure gradient, such that when the pressure gradient increases so does the speed of the wind.⁶ Because the pressure gradient is just the difference in pressure between high and low pressure areas, changes in weather patterns may recur seasonally.

Typically, high pressure brings clear skies and with no clouds, there is more incoming shortwave solar radiation causing temperatures to rise. When surface winds become light, the cooling of the air produced directly under a high-pressure system can lead to a buildup of particulates in urban areas under an elongated region of relatively high atmospheric pressure or ridge causing widespread haze. Conversely, a trough is an elongated region of relatively low atmospheric pressure often associated with fronts. Troughs may be at the surface, or aloft under various conditions. Most troughs bring clouds, showers, and a wind shift, particularly following the passage of the trough.

While windblown dust events in Imperial County during the fall, winter, and spring are often due to strong winds associated with low-pressure systems and cold fronts windblown dust events during the summer monsoon season are often due to wind flow aloft from the east or southeast. This phenomenon is known as the North American Monsoon (NAM)⁷. The NAM occurs when there is a shift in wind patterns during the summer, which occurs as Mexico and the southwest United States warm under intense solar heating reversing the flow from dry land areas to moist ocean areas. Consequently, the prevailing winds start to flow from moist ocean areas into dry land areas (**Figure 2-17**).

⁶ NWS JetStream – Origin of Wind <http://www.srh.noaa.gov/jetstream/synoptic/wind.html>

⁷ National Weather Service document “[North American Monsoon](#)” public domain material from the NWS Forecast Office Tucson, Arizona.

FIGURE 2-17
WEATHER PATTERN OF THE NORTH AMERICAN MONSOON

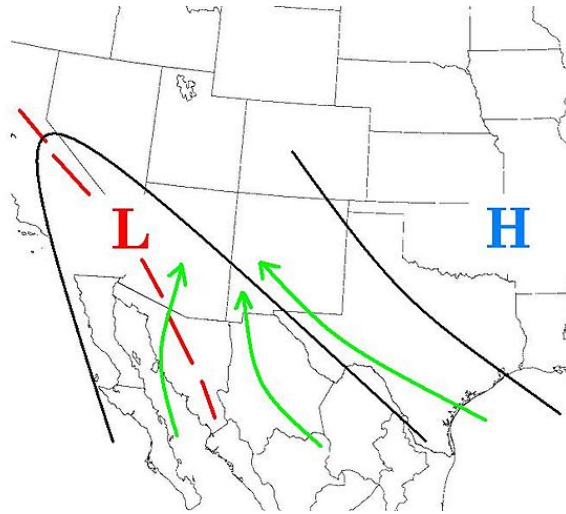


Fig 2-17: Weather pattern of the North American Monsoon. The North American monsoon, variously known as the Southwest monsoon, the Mexican monsoon, or the Arizona monsoon, is experienced as a pronounced increase in rainfall from an extremely dry June to a rainy July over large areas of the southwestern United States and northwestern Mexico. Image courtesy of Wikipedia “North American Monsoon”

The NAM circulation typically develops in late May or early June over southwest Mexico and by July or August has become fully developed. By mid to late summer, thunderstorms increase over the “core” region of the southwest United States and northwest Mexico⁸. The transport of moisture into Mexico, Arizona and the southwestern United States can come quickly and sometimes dramatically, known as “bursts” and “breaks” which can unleash violent flash floods, thousands of lightning strikes, crop-damaging hail, and walls of damaging winds and blowing dust.⁹

The monsoon typically arrives in mid to late June over northwest Mexico and early July over the southwest United States. While the southern areas of Mexico experience a low level monsoon circulation, transported primarily from the Gulf of California and eastern Pacific, an upper level monsoon (or subtropical) ridge develops over the southern High Plains and northern Mexico. By late June or early July the ridge shifts into the southern Plains or southern Rockies creating less resistance for the mid and upper level moisture streams to enter the United States. If the ridge is too close to a particular area, the sinking air, at its center suppresses thunderstorms and can result in a significant monsoon “break”. However, if the ridge sets up in a few key locations, widespread and potentially severe thunderstorms can develop.

⁸ According to the NWS Tucson Arizona regional office report affected areas include the United States, Arizona, New Mexico, Sonora, Chihuahua, Sinaloa and Durango.

⁹ 2004: The North American Monsoon. Reports to the Nation on our Changing Planet. NOAA/National Weather Service. Available on line at: http://www.cpc.noaa.gov/products/outreach/Report-to-the-Nation-Monsoon_aug04.pdf

In Imperial County, isolated thunderstorms begin to develop, mainly during the hottest part of the day. However, thunderstorms typically remain within central and eastern Arizona. This is because the upper level steering pattern and disturbances are ideal in central and eastern Arizona for influencing where thunderstorms develop on any given day. What typically reaches Imperial County are the outflows from these thunderstorms. These outflows create strong, gusty winds when lower levels of the atmosphere remain dry causing most of the rain not to reach the ground. On occasion, a few of these thunderstorms are pushed by these winds into the lower deserts during the evening hours.

II.3 Event Day Summary

The exceptional event for August 18, 2014, caused when the combination of a rather strong upper level low center approaching from the Northwest and the increasing moisture from the south caused afternoon and evening thunderstorms.¹⁰ The outflow from these thunderstorms over southwestern Arizona the evening of August 17, 2014 moved west across the lower deserts of Southern California towards San Diego County affecting Imperial County.

On August 18, 2014, gusty winds transported windblown dust from areas as far as northeastern Mexico. These gusty winds created by what the Phoenix NWS noted as outflows from a very large thunderstorm complex over extreme northwest Sonora Mexico affected air quality and caused an exceedance at the Niland monitor.¹¹

Figures 2-18 through 2-21 provide information regarding the forecasted area of instability and the conditions that created the ideal weather pattern for thunderstorm activity to occur and move from northern Mexico into Arizona then into California on August 18, 2014.

¹⁰ Area Forecast Discussion National Weather Service Phoenix AZ 205 AM PST (305 AM MST) and Hazardous Weather Outlook National Weather Service Phoenix AZ 214 PM PST (314 PM MST), Sunday, August 17, 2014

¹¹ Area Forecast Discussion National Weather Service San Diego CA, 240 AM PST (340 AM PDT), 820 AM PST (920 AM PDT), 100 PM PST (200 PM PDT), Monday, August 18, 2014

FIGURE 2-18
FORECAST MODEL FOR AUGUST 18, 2014

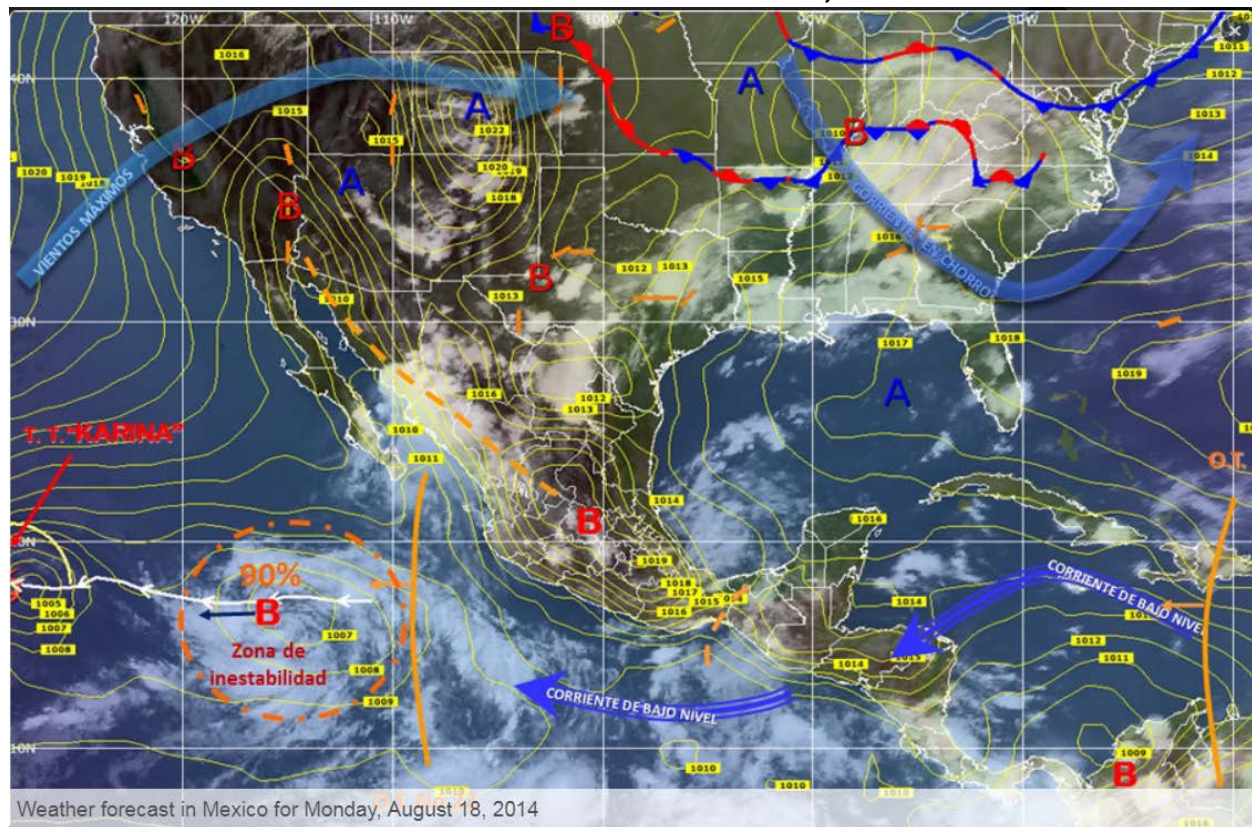


Fig 2-18: A forecast model for August 18, 2014 issued by e-consulta.com in Oaxaca Mexico on August 17, 2014 at 2032 PST. The article found in **Appendix A** describes a low-pressure channel located southeast and south of Mexico interacting with moisture from the Caribbean Sea and the Gulf of Mexico. The article identifies several areas affected by the instability, located west of Mexico, including Baja California. Baja California south was expected to have stronger rains and related thunderstorm activity than the northern portion of Baja California. The forecast model illustrates the path and expected low-pressure (B) position over southeastern California near the Nevada and Arizona borders. Note the low pressure (B) and high-pressure (A) positions and the airflow of the expected highest winds, blue arrow over California. Image courtesy of e-consulta.com Oaxaca

FIGURE 2-19
MODIS TODAY IMAGES AUGUST 18, 2014

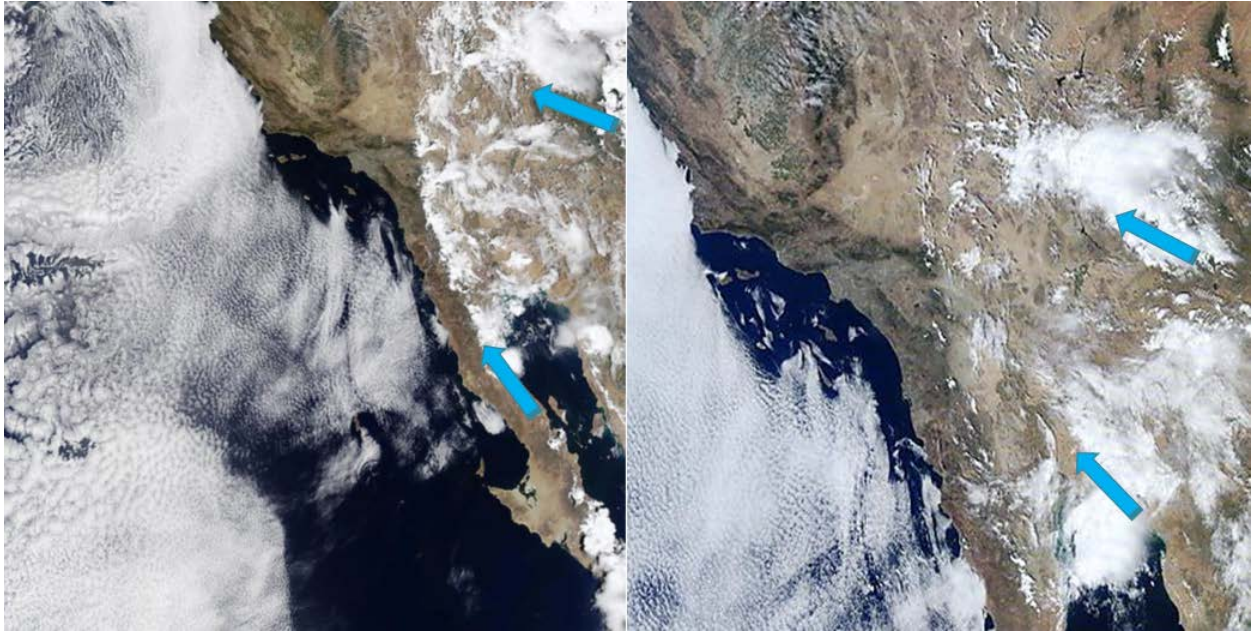


Fig 2-19: The AQUA and TERRA MODIS image captured the clouds associated with the monsoonal movement from the southeast and the low pressure from the west. Arrows are depictions of the general direction of the airflow created by the combination of a strong upper level low center from the northwest and the increasing moisture from the south as described by the NWS area forecast discussions. The monsoonal disturbance brought high winds to the region. Image: Space Science and Engineering Center, University of Wisconsin-Madison / MODIS Today; <http://ge.ssec.wisc.edu/modis-today>

FIGURE 2-20
SATELLITE SURFACE MAP ON AUGUST 18, 2014

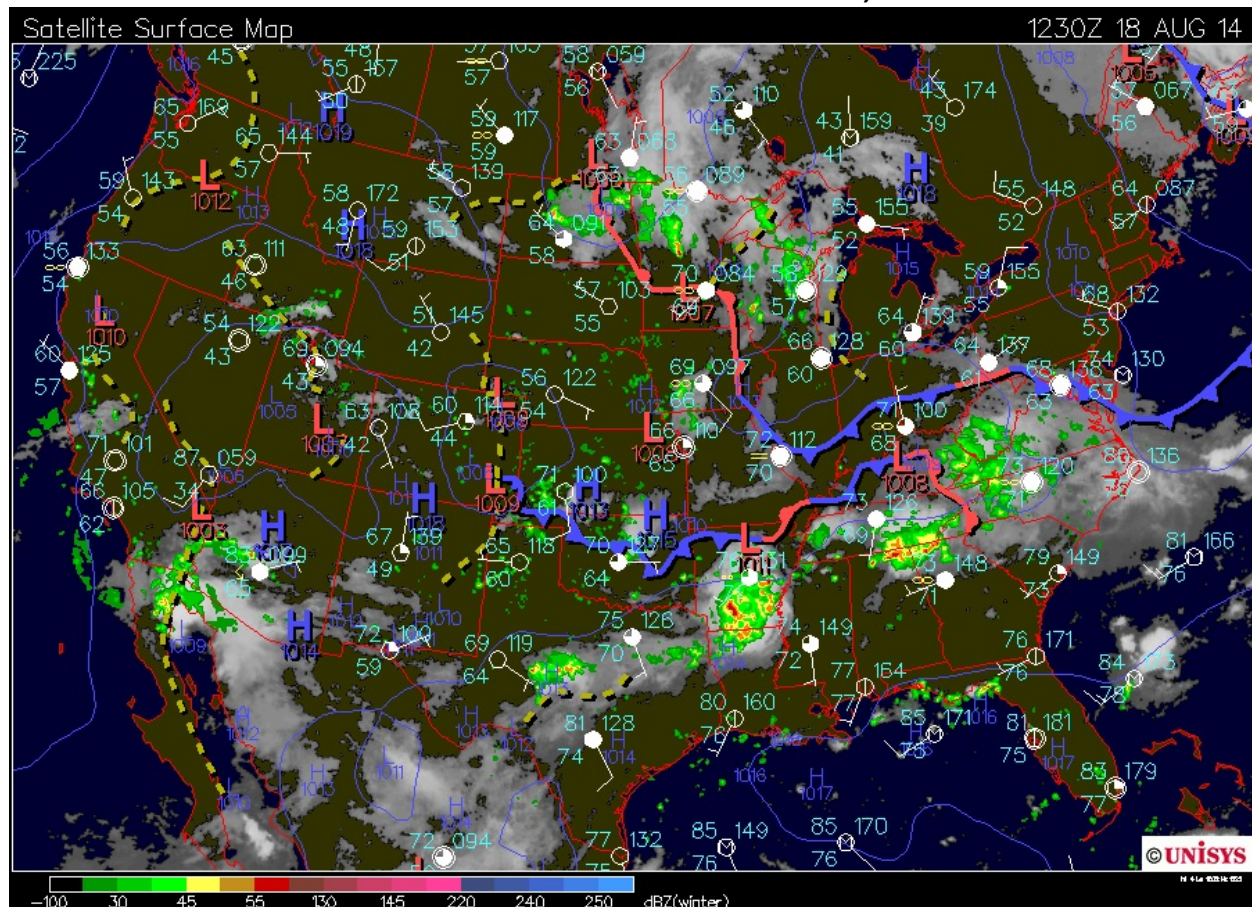


Fig 2-20: A satellite surface composite map (04:30 PST) on August 18, 2014, illustrates the regional domain of the monsoonal event, as well the moisture content over southeastern California. The unstable weather conditions created the conditions that transported windblown dust into Imperial County. Courtesy of Unisys Corporation; <http://weather.unisys.com/archives.php>

FIGURE 2-21
CONUS INFRARED AUGUST 18, 2014

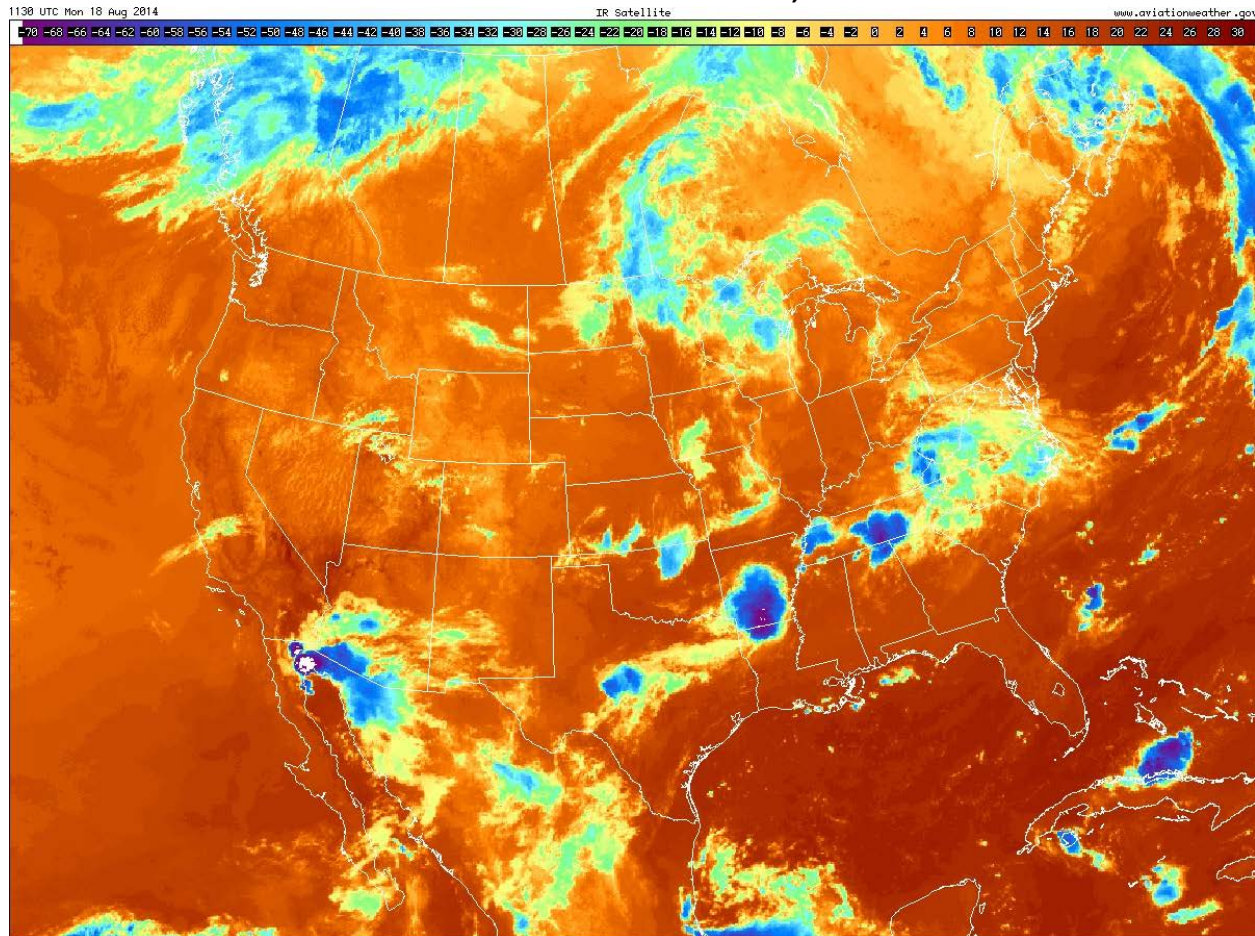


Fig 2-21: A CONUS infrared satellite image (03:30 PST) captured the intensity of the monsoonal system that moved northward from Mexico into southeastern California and southwestern Arizona. Cool colored clouds indicate cold cloud layers associated with convection. Source: National Center for Atmospheric Research, Mesoscale and Microscale Meteorology Laboratory;
http://www2.mmm.ucar.edu/episodes/access_data.html.

As early as August 15, 2014 the San Diego NWS office discussed the development of a low-pressure system approaching from the northwest, which would move slowly southward along the California Coast. By August 16, 2014, the San Diego NWS office identified a west-to-east oriented ridge over the region with a trough off the coast of Northern California forecasted to move south along the coast resulting in the development of an upper low on Monday, August 18, 2014.¹²

By August 17, 2014, both the San Diego and Phoenix NWS office discussions identified an early season Pacific low-pressure system moving southward along the California coast shifting the

¹² Area Forecast Discussion National Weather Service San Diego CA 743 PM PST (843 PM PDT) Saturday, August 16, 2014

upper high eastward from Arizona into Texas. The expectation of thunderstorms was limited to areas within the higher terrain north and east of Phoenix because of the expectation of a southwesterly flow aloft dominating the southeastern portion of California. In any event, the Phoenix NWS office described the combination of a rather strong upper level low center approaching from the northwest and increasing moisture from the south leading to a raised threat of afternoon and evening thunderstorms for Monday and Tuesday mainly over east-central Arizona (**Figure 2-18**). However, by 2208 PST (2308 MST) on August 17, 2014 the Phoenix NWS office issued a Special Weather Statement indicating that meteorologist detected strong winds ahead of thunderstorms east of the Yuma Proving Grounds and northwest of Tyson moving west at 25 mph (**Figure 2-22**). By the early morning hours of August 18, 2014 both the Phoenix and San Diego NWS, offices acknowledged that thunderstorm outflow was affecting southwestern Arizona and southern California.

A Short Term Forecast issued by the Phoenix office indicated gusty east to southeast thunderstorm outflow winds affecting much of Imperial County, winds 20 to over 40 mph with patchy blowing dust and sand. The San Diego NWS office discussed the gusty east to southeast winds reaching the deserts of San Diego county and southern Coachella Valley. Finally, the San Diego NWS office described the event as several mesoscale convective systems over southwest Arizona and Northern Mexico as producing outflow boundaries bringing an influx of low-level moisture into the deserts and mountains. As a result, the San Diego NWS office issued flood advisories.

FIGURE 2-22
PHOENIX NWS SPECIAL WEATHER STATEMENT ILLUSTRATION



Fig 2-22: An illustration of the Special Weather Statement issued by the Phoenix NWS office at 2208 PST August 17, 2014. Source: Google Earth base map

The chain of events illustrated in **Figure 2-23** provides an overall picture of the conditions that developed after the late evening push of winds on August 17, 2014 into the morning hours of August 18, 2014 when thunderstorm outflow winds, between 8 mph and 33 mph affected air quality and caused an exceedance at the Niland monitor in Imperial County.

FIGURE 2-23
RAMP-UP ANALYSIS AUGUST 18, 2014

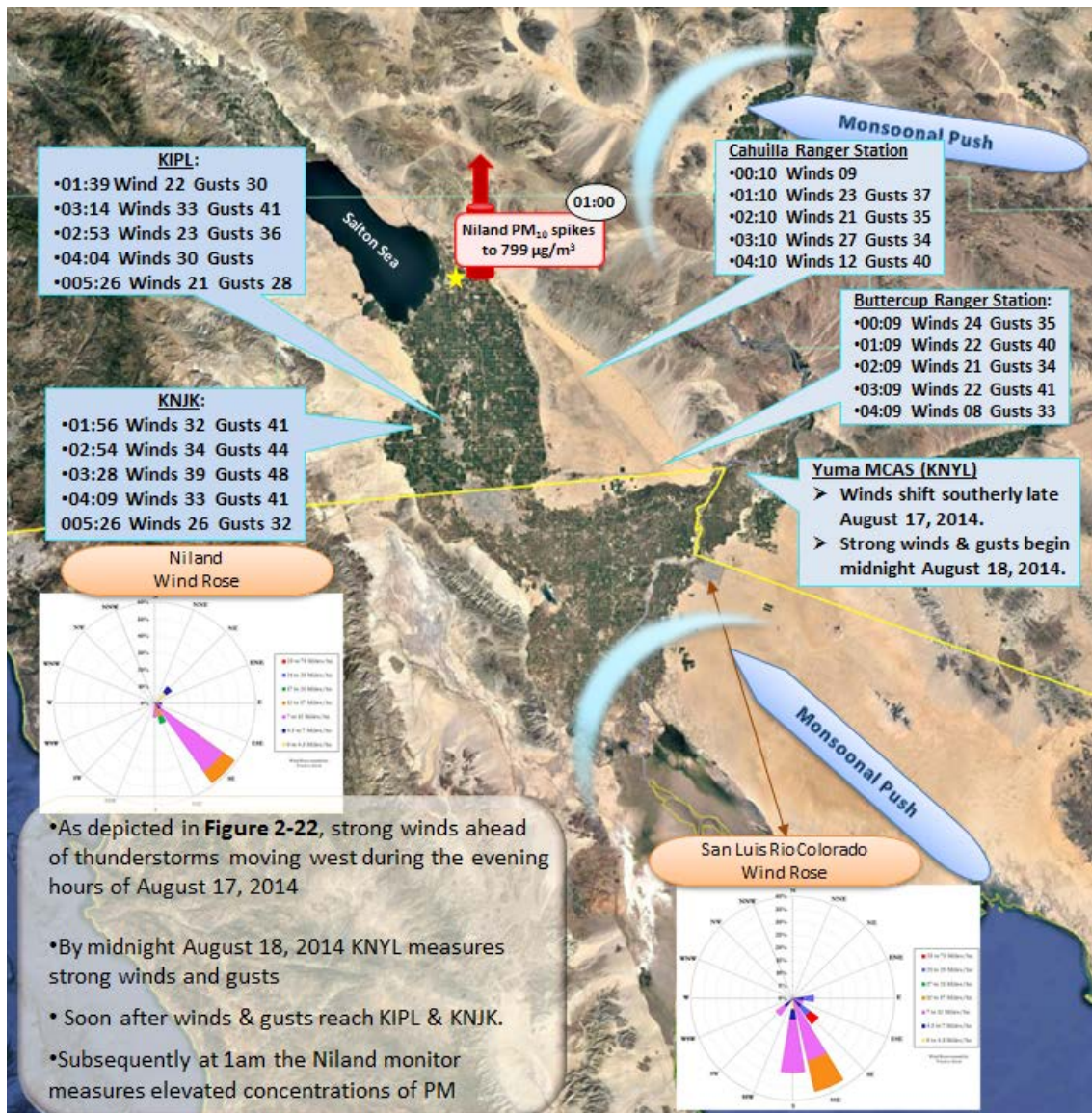


Fig 2-23: The ramp-up analysis provides the conditions that arose after the evening of August 17, 2014 when thunderstorm outflow winds transported windblown dust into Imperial County causing an exceedance at the Niland monitor August 18, 2014. Powerful outflow winds resulted when monsoonal air intruded into the region. The event was short-lived but generated strong winds. Wind data from the NCEI's QCLCD database and the University of Utah's MesoWest system. Air quality data from the EPA's AQS data bank. Google Earth base map

Table 2-2 contains a summary of maximum winds, peak wind gusts, and wind direction at monitors in Imperial County, eastern Riverside County, Yuma County, Arizona, and Mexicali. For detailed meteorological station, graphs see **Appendix B**.

TABLE 2-2
WIND SPEEDS ON AUGUST 18, 2014

Station Monitor	Maximum Wind Speed (WS) (mph)	Wind Direction during Max WS (degrees)	*Time of Max Wind Speed	24 hr Maximum Wind Gust (WG) (mph)	*Time of Max WG	PM ₁₀ correlated to time of Max Wind Speed	
Airport Meteorological Data						NInd	Brly
IMPERIAL COUNTY							
Imperial Airport (KIPL)	33	150	3:53	41	3:53	429.5	-
Naval Air Facility (KNJK)	39	140	3:56	48	3:56	429.5	-
Calexico (Ethel St)	17.4	142	3:00	-	-	429.5	-
El Centro (9th Street)	13.5	151	3:00	-	-	429.5	-
Niland (English Rd)	18	148	3:00	-	-	429.5	-
RIVERSIDE COUNTY							
Blythe Airport (KBLH)	20	170	12:52	21	3:26	37.3	33.3
Palm Springs Airport (KPSP)	24	100	5:40	29.9	5:40	592.4	190.7
Jacqueline Cochran Regional Airport (KTRM) - Thermal	33.4	140	4:43	43.7	4:43	-	421.5
ARIZONA - YUMA							
Yuma MCAS (KNYL)	37	80	0:32	43	0:32	26.1	34
MEXICALI - MEXICO							
Mexicali Int. Airport (MXL)	19.6	180	6:49	-	-	255	158.5

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted

The back-trajectory National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory HYSPLIT model,¹³ **Figure 2-24**, depicts the path of the airflow in the 12 hours prior to 10:00 PST coincident with the last hour of elevated concentrations at the Brawley and Niland monitors.

As the monsoonal system moved north from Mexico over natural open areas within northern Mexico, and Arizona, outflow winds from thunderstorm activity commenced moving west during the evening hours of August 17, 2014 affecting the Brawley and Niland monitors. The outflow winds transported windblown dust from areas located to the south and southeast of Imperial

¹³ The Hybrid Single Particle Lagrangian Integrated Trajectory Model (**HYSPLIT**) is a computer model that is a complete system for computing simple air parcel trajectories to complex dispersion and deposition simulations. It is currently used to compute air parcel trajectories and dispersion or deposition of atmospheric pollutants. One popular use of HYSPLIT is to establish whether high levels of air pollution at one location are caused by transport of air contaminants from another location. HYSPLIT's back trajectories, combined with satellite images (for example, from NASA's [MODIS](#) satellites), can provide insight into whether high air pollution levels are caused by local air pollution sources or whether an air pollution problem was blown in on the wind. The initial development was a result of a joint effort between NOAA and Australia's Bureau of Meteorology. Source: NOAA/Air Resources Laboratory, 2011.

County during the morning hours of August 18, 2014. The HYSPLIT model confirms the predominant wind direction measured at local meteorological sites as southeast. It is important to note that HYSPLIT modeled winds can differ from local conditions. Data used in the HYSPLIT model has a horizontal resolution of 12 km integrated every three hours. Thus, the HYSPLIT model may differ from local observed surface wind speeds and directions. During a monsoonal event, drifting thunderstorms can produce gusty winds from different directions. This can make it difficult to generate a HYSPLIT back-trajectory or forward-trajectory model that fits perfectly with the times of wind direction and speeds sampled at surface stations. The wind event of August 18, 2018 is one such event.

FIGURES 2-24
HYSPLIT BACK-TRAJECTORY MODEL AUGUST 18, 2014

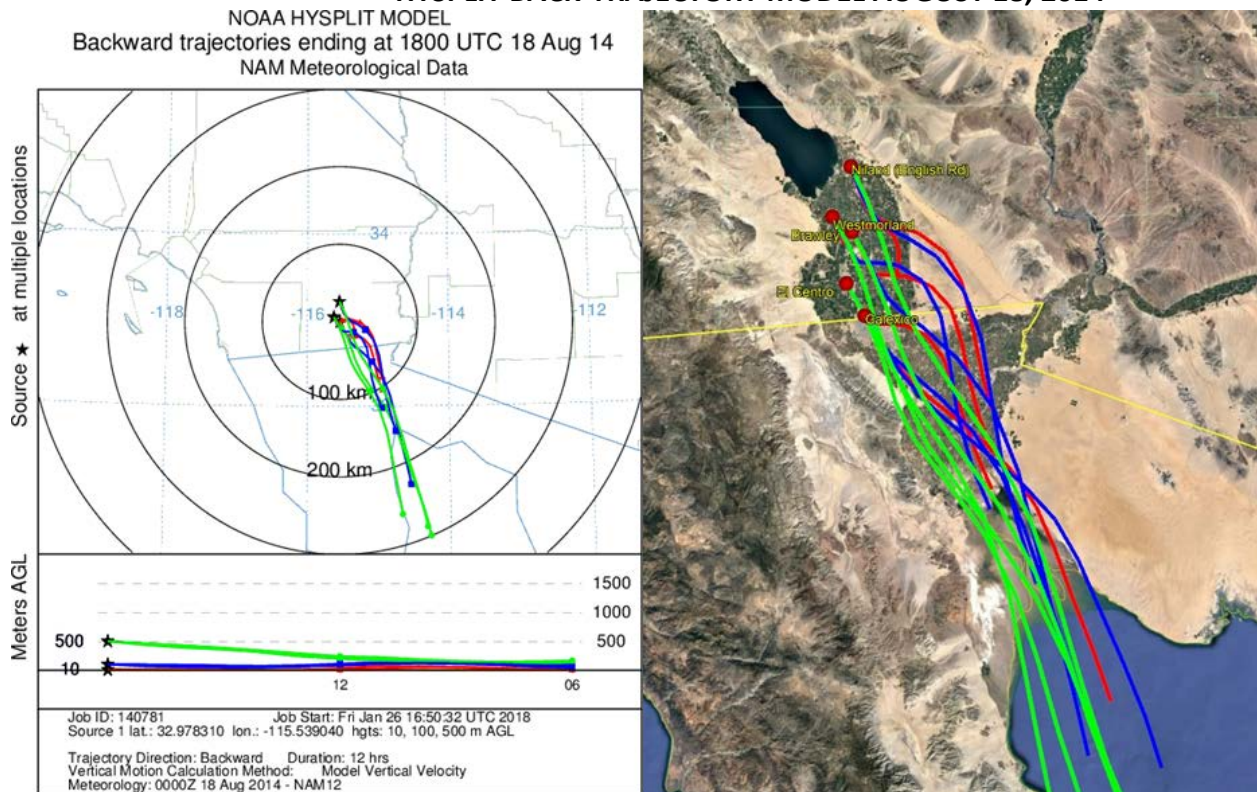


Fig 2-24: A 12-hour HYSPLIT back-trajectory ending at 10:00 PST August 18, 2014. The image to the left is the HYSPLIT for the monitors located within the northern portion of the air monitoring network on August 18, 2014. The model shows airflow up to 10 meters (red), 30 meters (blue), and 500m (green). Generated through NOAA Air Resources Laboratory HYSPLIT

Figures 2-25 and 2-26 illustrate the elevated winds and levels of hourly PM₁₀ concentrations measured in Riverside, Imperial and Yuma counties from August 17, 2014 through August 19, 2014. Elevated emissions entrained into Imperial County affected the Niland monitor when strong gusty winds generated by thunderstorm outflows caused by monsoonal air intruding into the region late on August 17, 2014 and into August 18, 2018. The Niland monitor measured the highest elevated concentrations between 01:00 PST and 10:00 PST coincident with continual

measured wind speeds and gusts above 25 mph.

The resulting entrained dust and accompanying high winds from the system qualify this event as a “high wind dust event”.¹⁴ High wind dust events are considered natural events where the windblown dust is either from solely a natural source or from areas where anthropogenic sources of windblown dust are controlled with Best Available Control Measures (BACM). The following sections provide evidence that the August 18, 2014 high wind event qualifies as a natural event and that BACM was overwhelmed by the suddenness and intensity of the meteorological event.

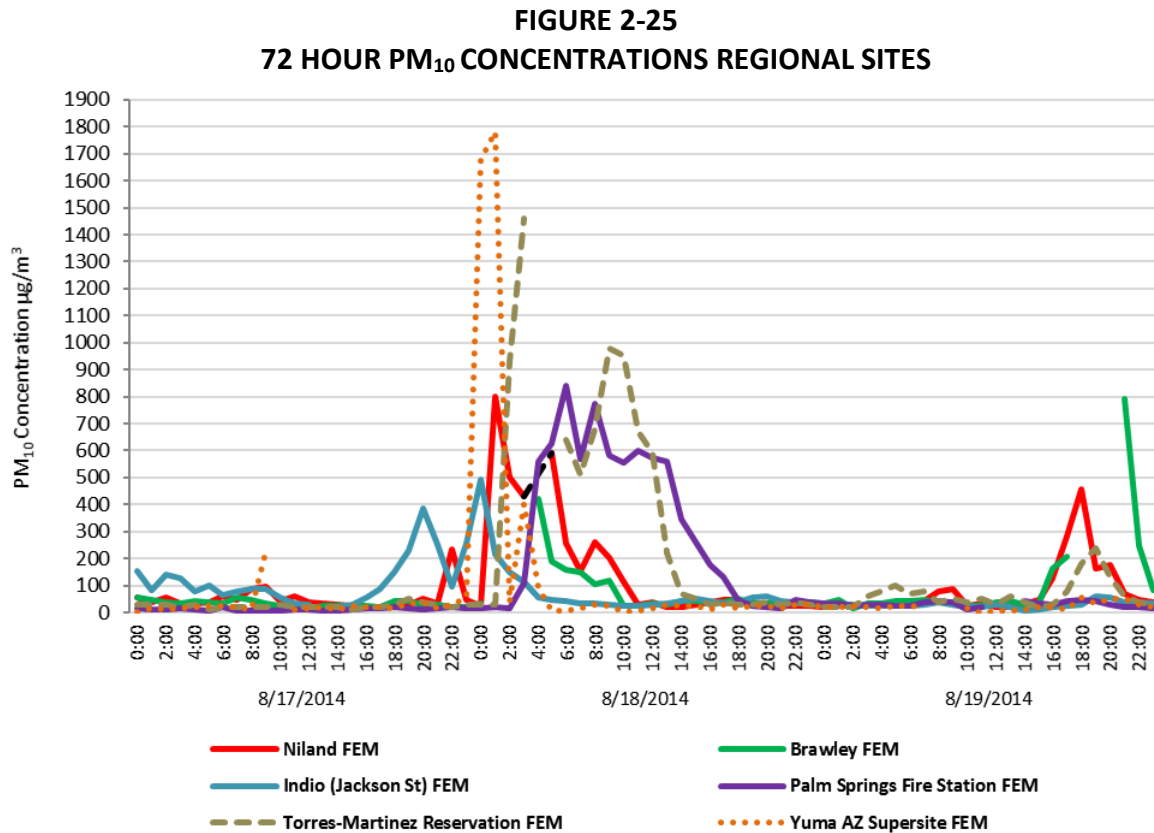


Fig 2-25: This is the graphical representation of the 72-hour relative PM₁₀ concentrations at various monitoring locations throughout Riverside, Imperial, and Yuma counties. The graph clearly demonstrates the regional effect of the gusty winds on August 18, 2014. Air quality data from the EPA’s AQS data bank

¹⁴ Title 40 Code of Federal Regulations part 50: §50.1(p) High wind dust event is an event that includes the high-speed wind and the dust that the wind entrains and transports to a monitoring site.

FIGURE 2-26
72 HOUR WIND SPEEDS REGIONAL SITES

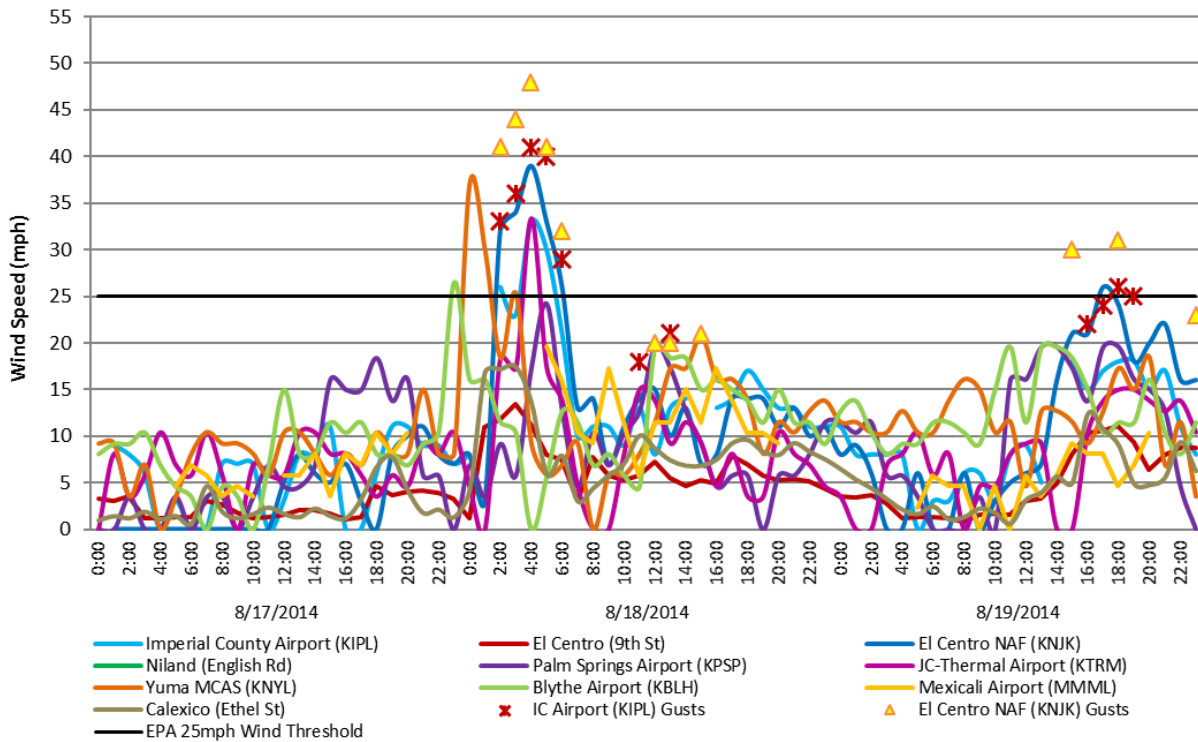


Fig 2-26: This graph illustrates the wind speeds and gusts for regional sites. All stations measured elevated winds, during the early morning hours of August 18, 2014. Wind data is from the EPA's AQS data; the NCEI's QCLCD system; and the Weather Underground

III Historical Concentrations

III.1 Analysis

While naturally occurring high wind events may recur seasonally and at times frequently and qualify for exclusion under the EER, historical comparisons of the particulate concentrations and associated winds provide insight into the frequency of events within an identified area. The following time series plots illustrate that PM₁₀ concentrations measured at the Niland monitor on August 18, 2014, compared to non-event and event days demonstrates the variability over several years and seasons. The analysis also provides supporting evidence that there exists a clear causal relationship between the August 18, 2014 high wind event and the exceedance measured at the Niland monitor.

Figures 3-1 and 3-2 show the time series of available FRM and BAM 24-hr PM₁₀ concentrations at the Niland monitor for the period of January 1, 2010 through August 18, 2014. Note that prior to 2013, BAM data was not FEM therefore, not reported into AQS.¹⁵ Properly establishing the variability of the event as it occurred on August 18, 2014, 24-hour averaged PM₁₀ concentrations between January 1, 2010 and August 18, 2014 were compiled and plotted as a time series. All figures illustrate that the exceedance, which occurred on August 18, 2014, were outside the normal historical concentrations when compared to event and non-event days. Air quality data for all graphs obtained through the EPA's AQS data bank.

¹⁵ Pollutant concentration data contained in EPA's Air Quality System (AQS) are required to be reported in units corrected to standard temperature and pressure (25 C, 760 mm Hg). Because the PM₁₀ concentrations prior to 2013 were not reported into the AQS database all BAM (FEM) data prior to 2013 within this report are expressed as micrograms per cubic meter (mg/m³) at local temperature and pressure (LTP) as opposed to standard temperature and pressure (STP, 760 torr and 25 C). The difference in concentration measurements between standard conditions and local conditions is insignificant and does not alter or cause any significant changes in conclusions to comparisons of PM₁₀ concentrations to PM₁₀ concentrations with in this demonstration.

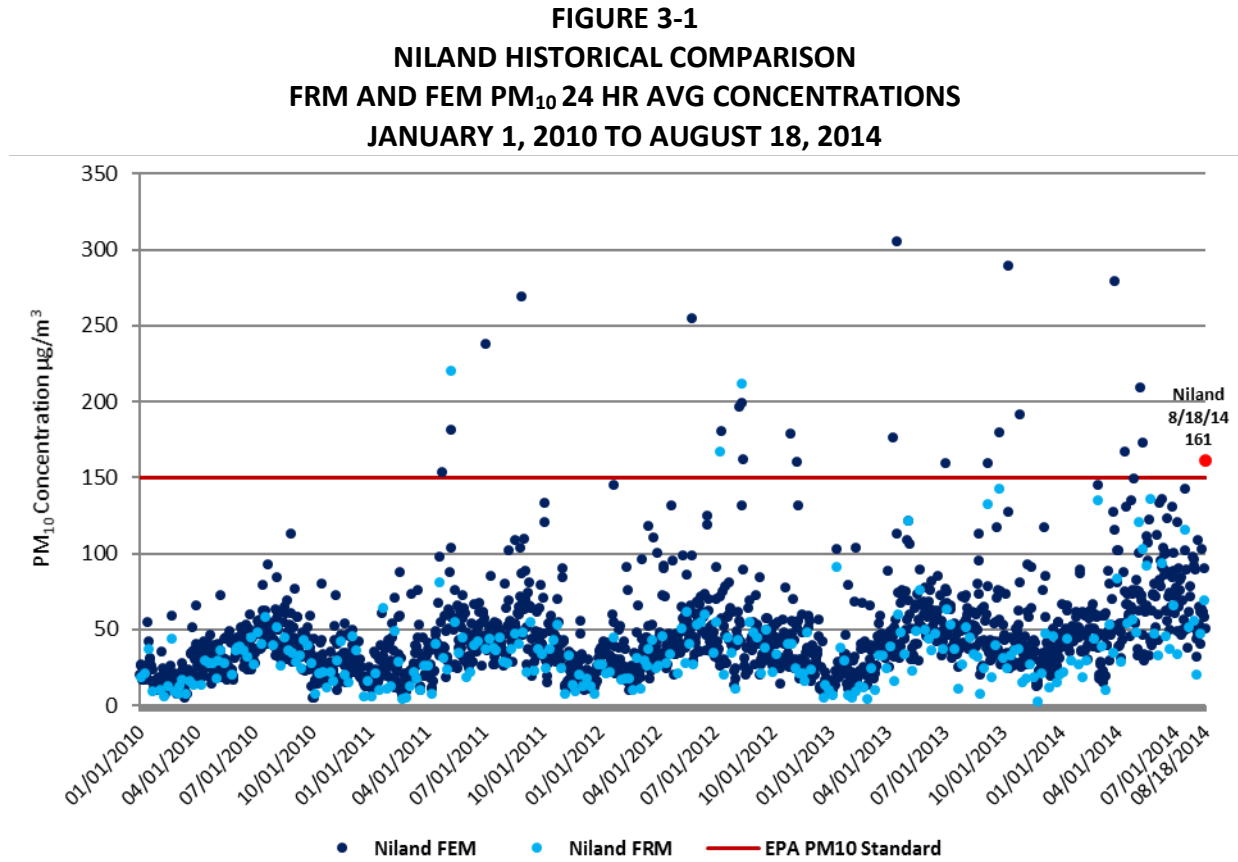
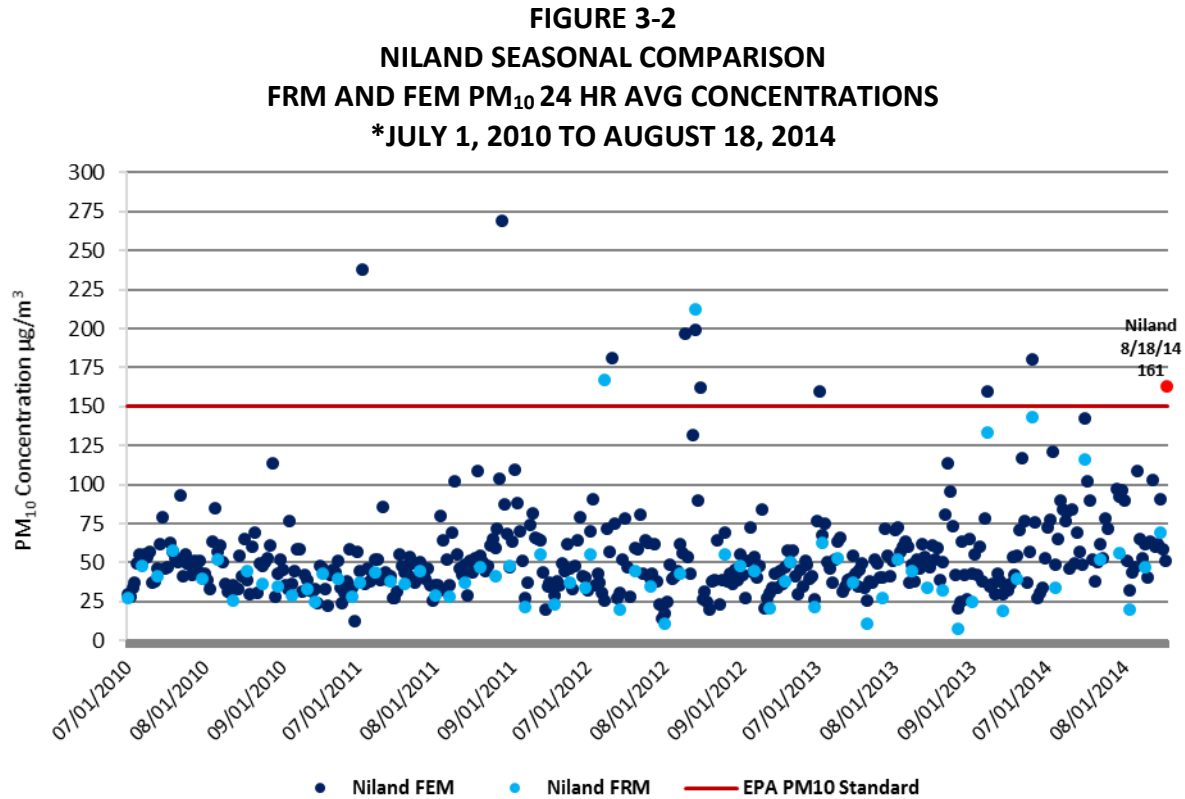


Fig 3-1: A comparison of PM₁₀ historical concentrations demonstrates that the measured concentration of 161 µg/m³ on August 18, 2014 by the Niland monitor was outside the normal historical concentrations when compared to similar event days and non-event days. Of the 1,691 sampling days there were 24 exceedance days which is less than a 1.5% occurrence rate

The time series, **Figure 3-1**, for Niland included 1,953 credible samples, measured between January 1, 2010 and August 18, 2014, or 1,691 sampling days.

Overall, the time series illustrates that the Niland monitor, measured 24 exceedance days out of the 1,691 sampling days, which is less than a 1.5% occurrence rate. Of the 24 measured exceedance days, 11 exceedance days occurred during the third quarter (July – September). The remaining 13 exceedance days occurred during the first, second and fourth quarters. The August 18, 2014 concentration is outside the normal historical measurements for the third quarter. No exceedances of the standard occurred during 2010. As mentioned above, FEM BAM data was not regulatory from 2010 to 2012.



*Quarterly; July 1, 2010 to September 30, 2013 and July 1, 2014 to August 18, 2014

Fig 3-2: A comparison of PM₁₀ seasonal concentrations demonstrate that the measured concentration of 161 µg/m³ by the Niland monitor on August 18, 2014 was outside the normal seasonal concentrations when compared to similar days and non-event days

Figure 3-2 displays the seasonal fluctuation over 417 sampling days at the Niland monitor for third quarter (July to September) between 2010 and 2014. The Niland monitor measured 482 credible samples over 417 sampling days. Of the 417 sampling days, there were 11 measured exceedance days, which equates to less than a 3.0% occurrence rate. The August 18, 2014 measured concentration at the Niland monitor was outside the normal historical and seasonal concentrations when compared to both event days and non-event days.

FIGURE 3-3
NILAND HISTORICAL
FRM AND FEM PM₁₀ 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO AUGUST 18, 2014

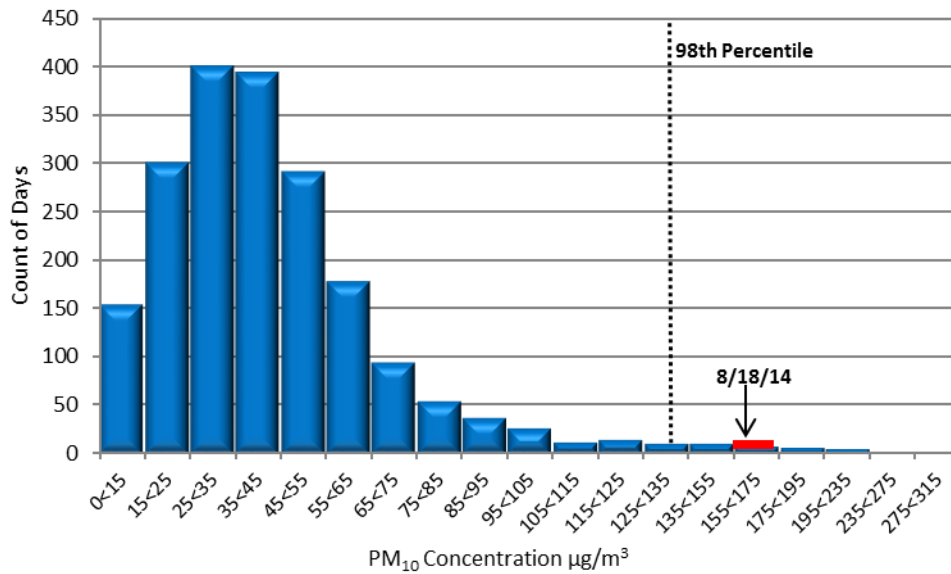
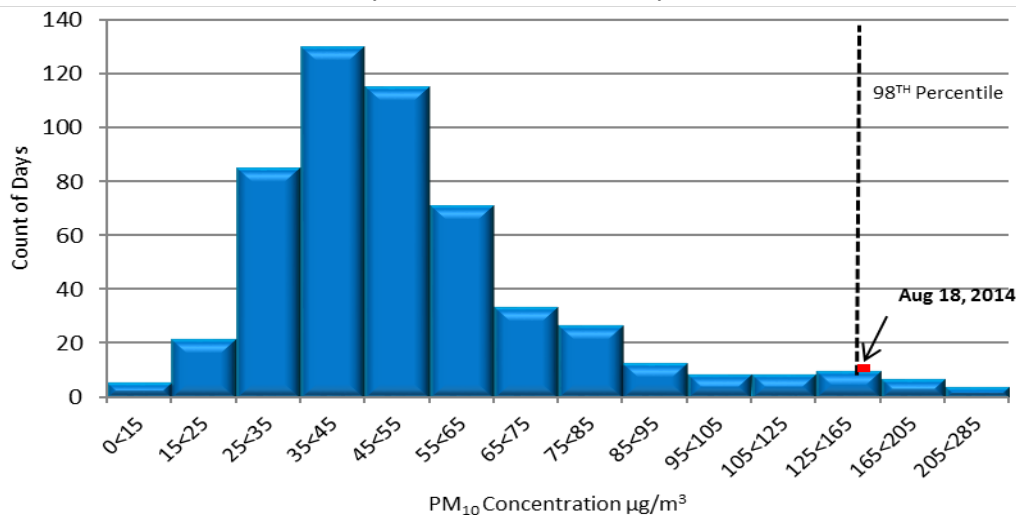


Fig 3-3: The 24-hr average PM₁₀ concentrations measured at the Niland monitor demonstrates that the August 18, 2014 event was in excess of the 98th percentile

FIGURE 3-4
NILAND SEASONAL
FRM AND FEM PM₁₀ 24 HR AVG CONCENTRATIONS
***JULY 1, 2010 TO AUGUST 18, 2014**



*Quarterly; July 1, 2010 to September 30, 2013 and July 1, 2014 to August 18, 2014

Fig 3-4: The 24-hr average PM₁₀ concentration at the Niland monitor demonstrates that the August 18, 2014 event was in excess of the 98th percentile

For the combined FRM and FEM data sets for the Niland monitor the annual historical and the seasonal historical PM₁₀ concentration of 161 µg/m³ both are above the 98th percentile rank. Looking at the annual time series concentrations, the seasonal time series concentrations and the percentile rankings for both the historical and seasonal patterns the August 18, 2014 measured exceedance is clearly outside the normal concentration levels when comparing to non-event days and event days.

III.2 Summary

The information provided, above, by the time series plots, seasonal time series plots, and the percentile rankings illustrate that the PM₁₀ concentration observed on August 18, 2014 occurred infrequently. When comparing the measured PM₁₀ level on August 18, 2014 and following USEPA EER guidance, this demonstration provides supporting evidence that the measured exceedance measured at the Niland monitor was outside the normal historical and seasonal historical concentration levels.

The historical concentration analysis provided here supports the determination that the August 18, 2014 natural event affected the concentrations level at the Brawley monitor causing an exceedance. The concentration analysis further supports that the natural event affected air quality in such a way that there exists a clear causal relationship between the measured exceedance on August 18, 2014 and the natural event, qualifying the natural event as an Exceptional Event.

IV Not Reasonably Controllable or Preventable

According to the October 3, 2016 promulgated revision to the Exceptional Event (EE) rule under 40 CFR §50.14(b)(8) air agencies must address the “not reasonably controllable or preventable” (nRCP) criterion as two prongs. To address the nRCP criterion the ICAPCD must not only identify the natural and anthropogenic sources of emissions causing and contributing to the monitored exceedance but must identify the relevant State Implementation Plan (SIP) measures and/or other enforceable control measures in place for the identified sources. An effective analysis of the nRCP must include the implementation status of the control measures to consider the measures as enforceable. USEPA considers control measures enforceable if approved into the SIP within 5 years of an EE demonstration submittal. The identified control measures must address those specific sources that as causing or contributing to a monitored exceedance.

The final EE rule revision explains that an event is not reasonably controllable if reasonable measures to control the impact of the event on air quality were applied at the time of the event. Similarly, an event is not reasonably preventable if reasonable measures to prevent the event were applied at the time of the event. However, for “high wind events” when PM₁₀ concentrations are due to dust raised by high winds from desert areas whose sources are controlled with Best Available Control Measures (BACM) then the event is a “natural event” where human activity plays little or no direct causal role and thus is considered not preventable

This section begins by providing background information on all SIP and other enforceable control measures in force during the EE for August 18, 2014. In addition, this August 18, 2014 demonstration provides technical and non-technical evidence that gusty southeasterly winds blew across the natural open deserts and urban areas of northern Mexico and southeastern California and into Imperial County suspending particulate matter affecting the Niland monitor on August 18, 2014. This section identifies all natural and anthropogenic sources and provides regulatory evidence of the enforceability of the control measures in place during the August 18, 2014 EE.

IV.1 Background

Inhalable particulate matter (PM₁₀) contributes to effects that are harmful to human health and the environment, including premature mortality, aggravation of respiratory and cardiovascular disease, decreased lung function, visibility impairment, and damage to vegetation and ecosystems. Upon enactment of the 1990 Clean Air Act (CAA) amendments, Imperial County was classified as moderate nonattainment for the PM₁₀ NAAQS under CAA sections 107(d)(4)(B) and 188(a). By November 15, 1991, such areas were required to develop and submit State Implementation Plan (SIP) revisions providing for, among other things, implementation of reasonably available control measures (RACM).

Partly to address the RACM requirement, ICAPCD adopted local Regulation VIII rules to control PM₁₀ from sources of fugitive dust on October 10, 1994, and revised them on November 25, 1996. USEPA did not act on these versions of the rules with respect to the federally enforceable SIP.

On August 11, 2004, USEPA reclassified Imperial County as a serious nonattainment area for PM₁₀. As a result, CAA section 189(b)(1)(B) required all BACM to be implemented in the area within four years of the effective date of the reclassification, i.e., by September 10, 2008.

On November 8, 2005, partly to address the BACM requirement, ICAPCD revised the Regulation VIII rules to strengthen fugitive dust requirements. On July 8, 2010, USEPA finalized a limited approval of the 2005 version of Regulation VIII, finding that the seven Regulation VIII rules largely fulfilled the relevant CAA requirements. Simultaneously, USEPA also finalized a limited disapproval of several of the rules, identifying specific deficiencies that needed to be addressed to fully demonstrate compliance with CAA requirements regarding BACM and enforceability.

In September 2010, ICAPCD and the California Department of Parks and Recreation (DPR) filed petitions with the Ninth Circuit Federal Court of Appeals for review of USEPA's limited disapproval of the rules. After hearing oral argument on February 15, 2012, the Ninth Circuit directed the parties to consider mediation before rendering a decision on the litigation. On July 27, 2012, ICAPCD, DPR and USEPA reached agreement on a resolution to the dispute, which included a set of specific revisions to Regulation VIII. These revisions are reflected in the version of Regulation VIII adopted by ICAPCD on October 16, 2012 and approved by USEPA April 22, 2013. Since 2006, ICAPCD had implemented regulatory measures to control emissions from fugitive dust sources and open burning in Imperial County.

**FIGURE 4-1
REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT**

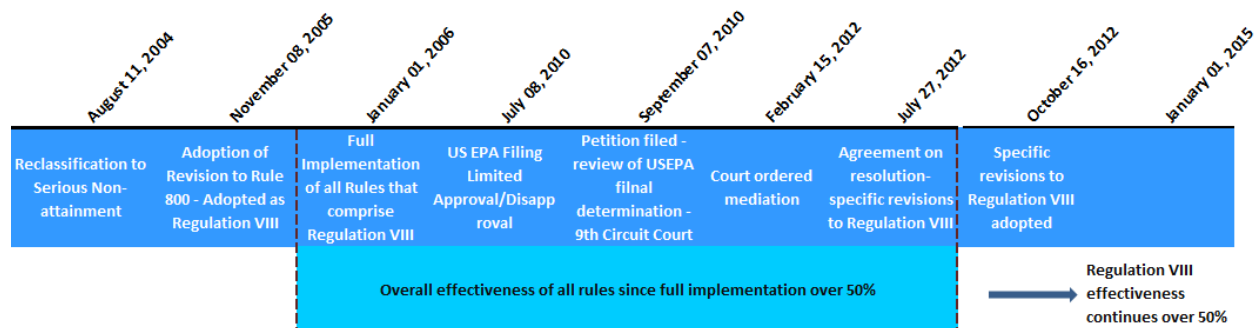


Fig 4-1: Regulation VIII Graphic Timeline

IV.1.a Control Measures

Below is a brief summary of Regulation VIII, which is comprised of seven fugitive dust rules. **Appendix D** contains a complete set of the Regulation VIII rules.

ICAPCD's Regulation VIII consists of seven interrelated rules designed to limit emissions of PM₁₀ from anthropogenic fugitive dust sources in Imperial County.

Rule 800, General Requirements for Control of Fine Particulate Matter, provides definitions, a compliance schedule, exemptions and other requirements generally applicable to all seven rules. It requires the United States Bureau of Land Management (BLM), United States Border Patrol (BP) and DPR to submit dust control plans (DCP) to mitigate fugitive dust from areas and/or activities under their control. Appendices A and B within Rule 800 describe methods for determining compliance with opacity and surface stabilization requirements in Rules 801 through 806.

Rule 801, Construction and Earthmoving Activities, establishes a 20% opacity limit and control requirements for construction and earthmoving activities. Affected sources must submit a DCP and comply with other portions of Regulation VIII regarding bulk materials, carry-out and track-out, and paved and unpaved roads. The rule exempts single family homes and waives the 20% opacity limit in winds over 25 mph under certain conditions.

Rule 802, Bulk Materials, establishes a 20% opacity limit and other requirements to control dust from bulk material handling, storage, transport and hauling.

Rule 803, Carry-Out and Track-Out, establishes requirements to prevent and clean-up mud and dirt transported onto paved roads from unpaved roads and areas.

Rule 804, Open Areas, establishes a 20% opacity limit and requires land owners to prevent vehicular trespass and stabilize disturbed soil on open areas larger than 0.5 acres in urban areas, and larger than three acres in rural areas. Agricultural operations are exempted.

Rule 805, Paved and Unpaved Roads, establishes a 20% opacity limit and control requirements for unpaved haul and access roads, canal roads and traffic areas that meet certain size or traffic thresholds. It also prohibits construction of new unpaved roads in certain circumstances. Single-family residences and agricultural operations are exempted.

Rule 806, Conservation Management Practices, requires agricultural operation sites greater than 40 acres to implement at least one conservation management practice (CMP) for each of several activities that often generates dust at agricultural operations. In addition, agricultural operation sites must prepare a CMP plan describing how they comply with Rule 806, and must make the CMP plan available to the ICAPCD upon request.

IV.1.b Additional Measures

Imperial County Natural Events Action Plan (NEAP)

On August 2005, the ICAPCD adopted a NEAP for the Imperial County, as was required under the former USEPA Natural Events Policy, to address PM₁₀ events by:

- Protecting public health;
- Educating the public about high wind events;
- Mitigating health impacts on the community during future events; and
- Identifying and implementing BACM measures for anthropogenic sources of windblown dust.

Smoke Management Plan (SMP) Summary

There are 35 Air Pollution Control Districts or Air Quality Management Districts in California, which are required to implement a district-wide smoke management program. The regulatory basis for California's Smoke Management Program, codified under Title 17 of the California Code of Regulations is the "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Guidelines). California's 1987 Guidelines revised to improve interagency coordination, avoid smoke episodes, and provide continued public safety while providing adequate opportunity for necessary open burning. The revisions to the 1987 Guidelines approved March 14, 2001. All air districts, with the exception of the San Joaquin Valley Air Pollution Control District (SJAPCD) were required to update their existing rules and Smoke Management Plans to conform to the most recent update to the Guidelines.

Section 80150 of Title 17 specifies the special requirements for open burning in agricultural operations, the growing of crops and the raising of fowl or animals. This section specifically requires the ICAPCD to have rules and regulations that require permits that contain requirements that minimize smoke impacts from agricultural burning.

On a daily basis, the ICAPCD reviews surface meteorological reports from various airport agencies, the NWS, State fire agencies and CARB to help determine whether the day is a burn day. Using a four-quadrant map of Imperial County allowed burns are allocated in such a manner as to assure minimal to no smoke impacts safeguarding the public health. Finally, all permit holders are required to notice and advise members of the public of a potential burn. This noticing requirement is the Good Neighbor Policy. On August 18, 2014, declared a No Burn day, the ICAPCD did not receive any complaints related to agricultural burning. **Appendix A** contains copies of notices pertinent to the August 18, 2014 event.

IV.1.c Review of Source-Permitted Inspections and Public Complaints

A query of the ICAPCD permit database was compiled and reviewed for active permitted sources throughout Imperial County and specifically around Niland during the August 18, 2014 PM₁₀ exceedance. Both permitted and non-permitted sources are required to comply with Regulation VIII requirements that address fugitive dust emissions. The identified permitted sources are Aggregate Products, Inc., US Gypsum Quarry, Imperial Aggregates (Val-Rock, Inc., and Granite Construction), US Gypsum Plaster City, Clean Harbors (Laidlaw Environmental Services), Bullfrog Farms (Dairy), Burrtec Waste Industries, Border Patrol Inspection station, Centinela State Prison, various communications towers not listed and various agricultural operations. Non-permitted sources include the wind farm known as Ocotillo Express, and a solar facility known as CSolar IV West. Finally, the desert regions are under the jurisdiction of the Bureau of Land Management and the California Department of Parks (Including Anza Borrego State Park and Ocotillo Wells).

An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based PM₁₀ emissions. There were no complaints filed on August 18, 2014, officially declared as No Burn days, related to agricultural burning, waste burning or dust.

FIGURE 4-2
PERMITTED SOURCES



Fig 4-2: The above map identifies those permitted sources located west, northwest and southwest of the Niland monitor. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States and Mexico. The green checker-boarded areas are a mixed use of agricultural and community parcels. In addition, either the Bureau of Land Management or the California Department of Parks manages the desert areas. Base map from Google Earth

FIGURE 4-3
NON-PERMITTED SOURCES

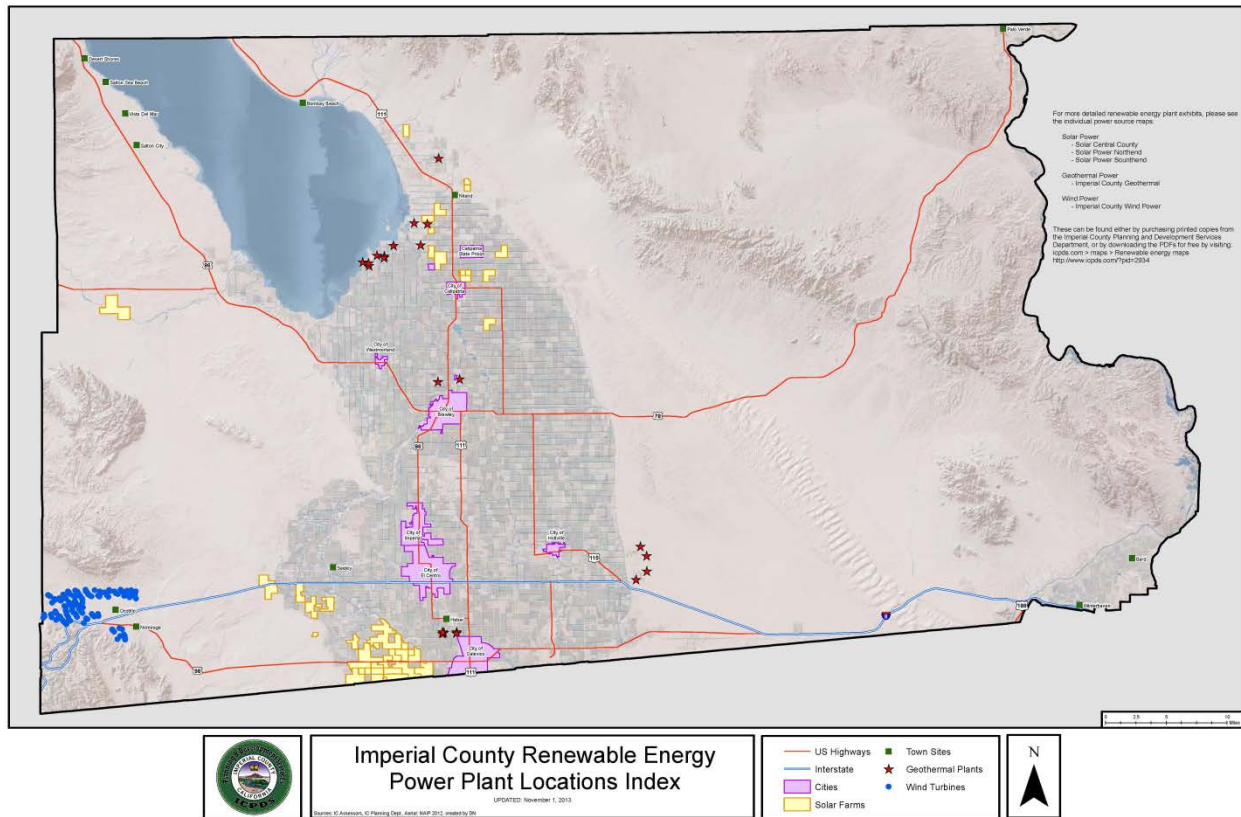


Fig 4-3: The above map identifies those power sources located west, northwest and southwest of the Niland monitor. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants

IV.2 Forecasts and Warnings

As mentioned above, the ICAPCD provide the NWS notifications via the ICAPCD's webpage that an early season Pacific low-pressure system would approach the region adding to the existing moisture levels. Increased moisture levels could potentially increase the southerly flow and could potentially cause thunderstorm activity. The Area Forecast Discussion issued by the San Diego NWS office during the morning hours of August 18, 2014 identified outflow from thunderstorms overnight on August 17, 2014 as causing blowing dust and sand. In addition, the ICAPCD posted the notices issued by the National Weather Service (NWS) warning of thunderstorms and gusty winds up to 40 mph.

Finally, an alert issued for Niland on August 18, 2014 provided air quality information to the public.¹⁶ The web based AQI alert by the ICAPCD on August 18, 2014 identified PM₁₀ levels (101-

¹⁶ The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health affects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone,

150 $\mu\text{g}/\text{m}^3$) in the Niland area as “Unhealthy for Sensitive Groups.” The web-based alert read: “People with respiratory or heart disease, the elderly, and children are the groups most at risk, especially when they are physically active. There is an increased likelihood of respiratory symptoms in sensitive individuals, and aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly. U.S. EPA cautions that people with heart or lung disease, older adults, and children should reduce prolonged or heavy exertion.”

Appendix A contains copies of notices pertinent to the August 18, 2014 event.

IV.3 Wind Observations

Wind data during the event were available from airports in eastern Riverside County, southeastern San Diego County, southwestern Yuma County (Arizona), northern Mexico, and Imperial County (**Table 2-2**). Similarly, other data from automated meteorological instruments upstream from the Brawley, Westmorland, and Niland monitors during the wind event. Both KIPL, KNJK, and KNYL reported multiple measurements of winds exceeding the 25 mph threshold. The KNJK measured the peak gust of 48 mph. Upstream wind sites near the source area also measured gusty winds. Wind speeds at 25 mph are normally sufficient to overcome most PM_{10} control measures. During the August 18, 2014 event, wind speeds were at or above the 25 mph threshold overcoming the BACM in place.

IV.4 Summary

The weather and air quality forecast discussions and warnings outlined in this section demonstrate that an intrusion of unstable monsoonal air (also known as a “gulf surge”) created strong gusty winds caused by thunderstorm outflows. Alternating wind directions from east to south occurred during the day. The strong, gusty winds that moved through southeastern California and southern Arizona caused uncontrollable PM_{10} emissions over a wide region. The BACM list as part of the control measures in Imperial County for fugitive dust emissions were in place at the time of the event. These control measures are required for areas designated as “serious” non-attainment for PM_{10} , such as Imperial County. Thus, the BACM in place at the time of the event were beyond reasonable. In addition, surface wind measurements upstream from Niland during the event were high enough (at or above 25 mph, with wind gusts over 35 mph) that BACM PM_{10} control measures would have been overwhelmed.

Finally, a high wind dust event may be a natural event, even when portions of the wind-driven emissions are anthropogenic so long as those emissions have a clear causal relationship to the event and are determined to be not reasonably controllable or preventable. This demonstration has shown that the event that occurred on August 18, 2014 was not reasonably controllable or preventable despite the strong and in force BACM within the affected areas in Imperial County. This demonstration has similarly established a clear causal relationship between the exceedance

particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country. Source: <https://airnow.gov/index.cfm?action=aqibasics.aqi>

and the high wind event timeline and geographic location. Thus, the August 18, 2014 event is an exceptional event under the requirements of the exceptional event rule.

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V Clear Causal Relationship

V.1 Discussion

Meteorological observations for August 18, 2014 identified a very large thunderstorm complex over extreme northwest Sonora Mexico that resulted from the combination of southerly to southwesterly flow ahead of a rather strong upper level low center moving southward along the California coast that pulled additional moisture northward into Arizona. The outflow from the large thunderstorm created several mesoscale convective systems over southwest Arizona and northern Mexico producing outflow boundaries. The outflow boundaries from these thunderstorms over southwestern Arizona moved west across the lower deserts of Southern California towards San Diego County, the evening of August 17, 2014 affecting Imperial County during the early morning hours of August 18, 2014.¹⁷

Entrained windblown dust from natural areas, particularly from the open desert areas south to southeast of the Niland monitor, along with anthropogenic sources controlled with BACM, is confirmed by the meteorological and air quality observations on August 18, 2014.

Figure 5-1 is a visible satellite image that shows a cluster of thunderstorm clouds along the Mexico-Arizona-California border at 0630 PST. Thunderstorms like these were responsible for the gusty outflows winds that transported windblown dust during the morning hours of August 18, 2014.

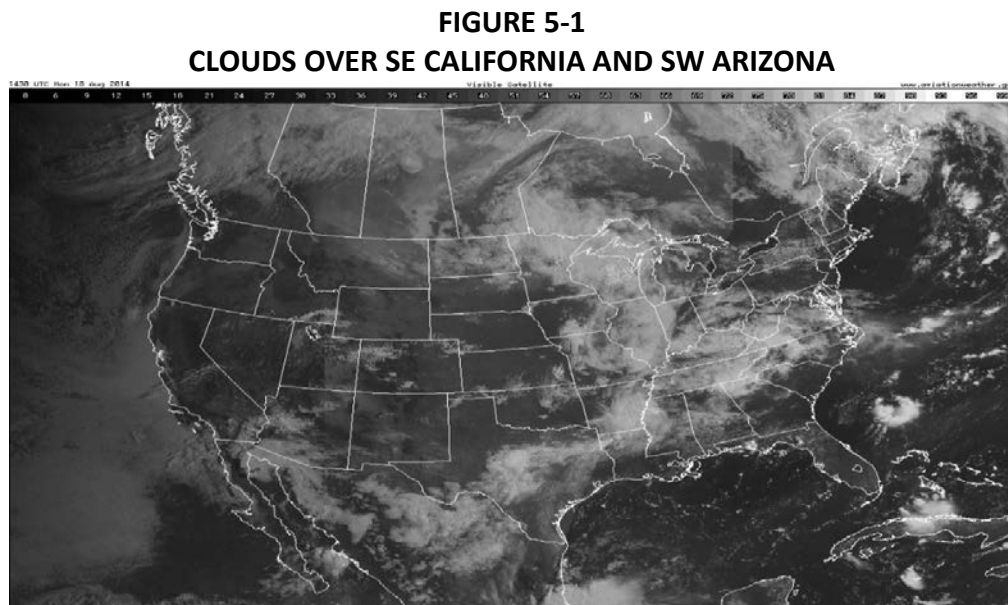


Fig 5-1: A CONUS visible satellite image at 06:30 PST showing thunderstorm clouds on the CA-AZ-MX border. Source: <http://www2.mmm.ucar.edu/imagearchive>

¹⁷ Area Forecast Discussion National Weather Service San Diego CA 240 AM PST (340 AM PDT); 820 AM PST (920 AM PDT) and Phoenix AZ 420 AM PST (520 AM MST), Monday, August 18, 2014

Figure 5-2 is a satellite image that shows the Aerosol Optical Depth (AOD) at ~1030 PST on August 18, 2014. Unfortunately, both the Terra and Aqua satellites carrying the MODIS instrument made their pass following peak PM₁₀ concentrations.¹⁸

FIGURE 5-2
MODIS DEEP BLUE AEROSOL OPTICAL DEPTH (LAND) AUGUST 18, 2014

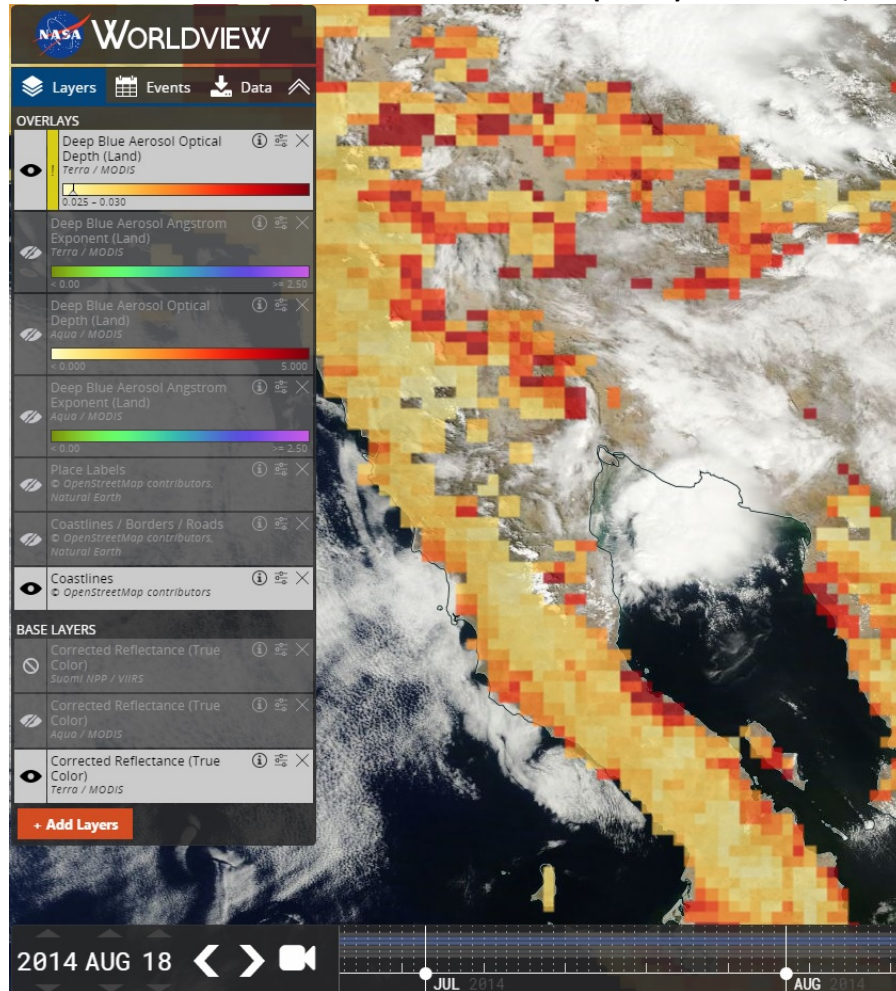


Fig 5-2: AOD over Imperial County at ~1030 PST. Warmer colors indicate thicker layers of aerosols. Source: NASA Worldview; <https://worldview.earthdata.nasa.gov>

¹⁸ **Aerosol Optical Depth (AOD)** (or Aerosol Optical Thickness) indicates the level at which particles in the air (aerosols) prevent light from traveling through the atmosphere. Aerosols scatter and absorb incoming sunlight, which reduces visibility. From an observer on the ground, an AOD of less than 0.1 is “clean” - characteristic of clear blue sky, bright sun and maximum visibility. As AOD increases to 0.5, 1.0, and greater than 3.0, aerosols become so dense that sun is obscured. Sources of aerosols include pollution from factories, smoke from fires, dust from dust storms, sea salt, and volcanic ash and smog. Aerosols compromise human health when inhaled by people, particularly those with asthma or other respiratory illnesses. Source: <https://worldview.earthdata.nasa.gov>. **MODIS (or Moderate Resolution Imaging Spectroradiometer)** is a key instrument aboard the Terra (originally known as EOS AM-1) and Aqua (originally known as EOS PM-1) satellites. Terra's orbit around the Earth is timed so that it passes from north to south across the equator in the morning, while Aqua passes south to north over the equator in the afternoon. MODIS Technical Specifications identify the Terra orbit at 10:30am and the Aqua at 130pm.

Figure 5-3 uses the Deep Blue Angstrom Exponent¹⁹ layer to identify larger aerosol particles that are likely dust, as indicated by the greenish colored areas. See also the legend on the left of the image that shows that the darker green areas are likely dust.

FIGURE 5-3
MODIS DEEP BLUE AEROSOL ANGSTROM EXPONENT (LAND) AUGUST 18, 2014

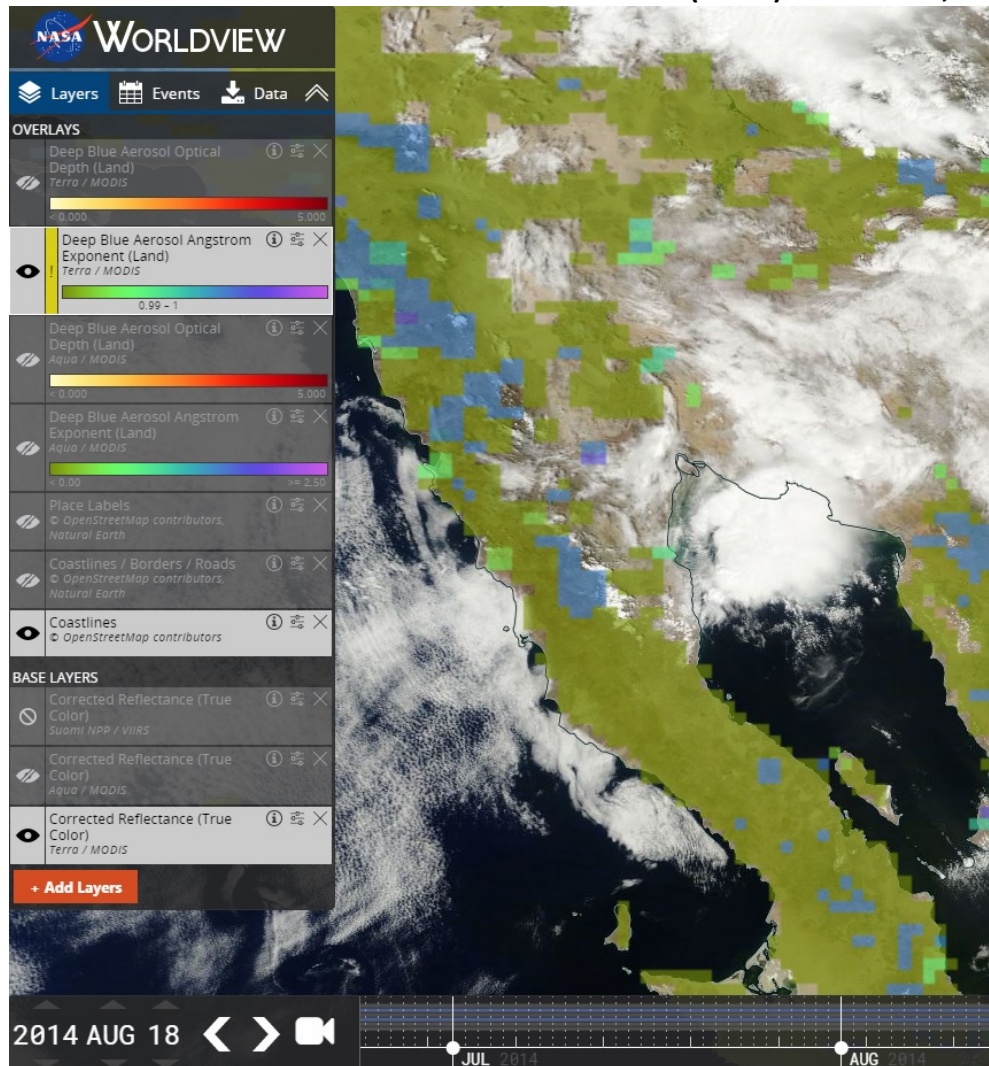


Fig 5-3: AOD over Imperial County at ~10:30 PST. Darker shades of green indicate particles that are likely dust. Source: NASA Worldview; <https://worldview.earthdata.nasa.gov>

¹⁹ The MODIS Deep Blue Aerosol Ångström Exponent layer can be used to provide additional information related to the aerosol particle size over land. This layer is created from the Deep Blue (DB) algorithm, originally developed for retrieving over desert/arid land (bright in the visible wavelengths). The Ångström exponent provides additional information on the particle size (larger the exponent, the smaller the particle size). Values < 1 suggest optical dominance of coarse particles (e.g. dust) and values > 1 suggest optical dominance of fine particles (e.g. smoke). Source: NASA Worldview; <https://worldview.earthdata.nasa.gov>

Figure 5-4 is a trio of NEXRAD radar images that shows the push of monsoonal air that led to the wind event. A series of strong storm cells indicated by the brighter shades of orange and red pushed northward out of Mexico.

FIGURE 5-4
NEXRAD RADAR BASE REFLECTIVITY IMAGES AUGUST 18, 2014

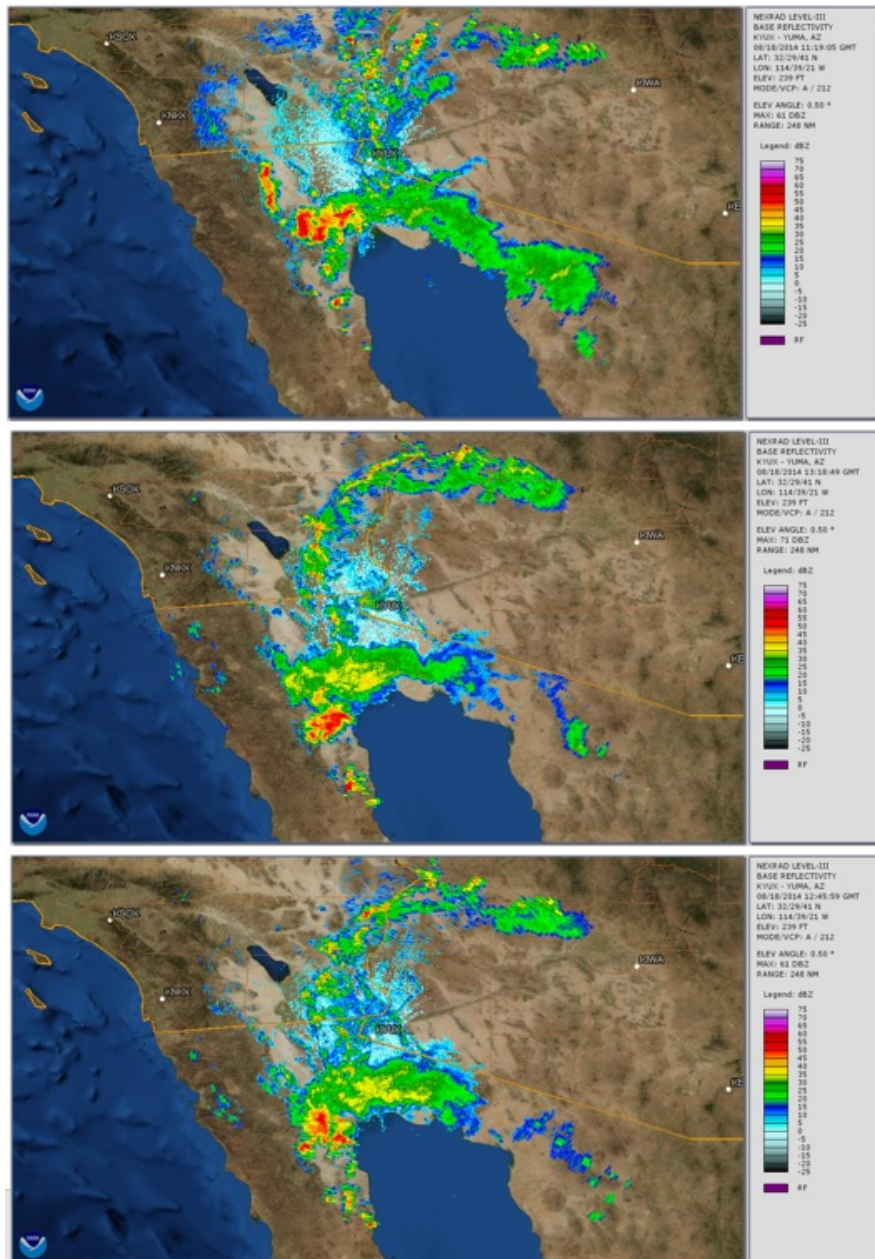


Fig 5-4: A trio of base reflectivity images captured by the Yuma, Arizona NEXRAD radar station on August 18 at 0319 PST, 0445 PST, and 0518 PST. Warmer colors indicate strongest areas of the system. Dynamically generated through NOAA Weather & Climate Toolkit

Figure 5-5 is a trio of NEXRAD storm relative velocity images that show the relative velocity of the winds. Although NEXRAD data is available only for the extreme southeastern portion of Imperial County, it does provide a general view of the velocity of the winds.

FIGURE 5-5
NEXRAD RADAR RELATIVE VELOCITY IMAGES AUGUST 18, 2014

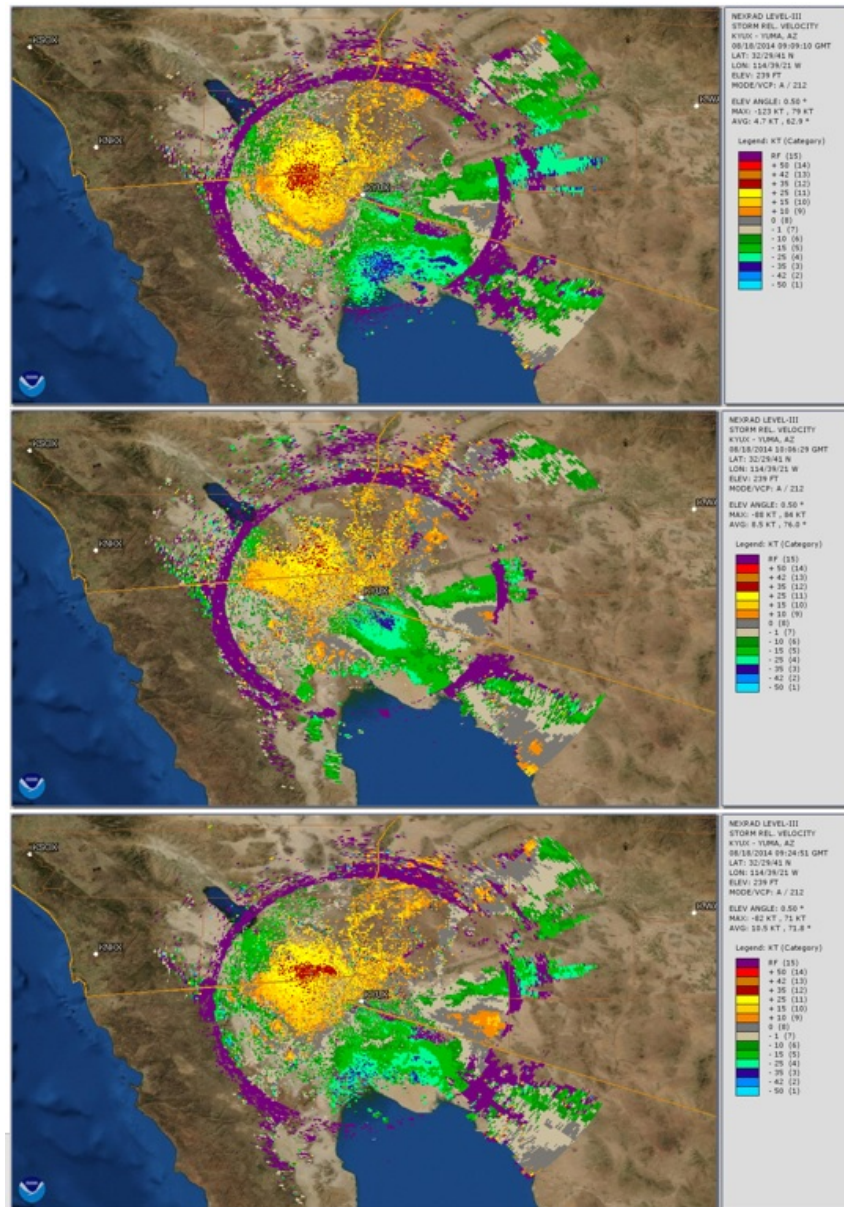


Fig 5-5: A trio of storm relative velocity images captured by the Yuma, Arizona NEXRAD radar station on August 18 at 0109 PST, 0245 PST, and 0124 PST. This was during the hour of some of the strongest winds. Orange, yellow, and red colors indicate motion away from the radar, while green and blues indicate motion toward the radar. Brighter colors of each shade indicate higher wind velocity. Dynamically generated through NOAA Weather & Climate Toolkit

The EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states.²⁰ **Tables 5-1 through 5-3** provide a temporal relationship of wind speeds, wind direction, wind gusts (if available), and PM₁₀ concentrations at the exceeding stations. When winds of 31 to 39 mph for one (1) hour or longer are forecasted the NWS issues Wind advisories.²¹ As discussed above the NWS identified outflow winds and blowing dust and sand the evening of August 17, 2014. A Short Term Forecast, issued by the Phoenix NWS office continued to identify the gusty east to southeast thunderstorm outflow winds leading to patchy blowing dust and sand.²²

TABLE 5-1
WIND SPEEDS AND PM₁₀ CONCENTRATIONS FOR NILAND AUGUST 18, 2014

YUMA MCAS				EL CENTRO NAF				IMPERIAL COUNTY AIRPORT				MEXICALI, MEXICO AIRPORT				NILAND	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	PM ₁₀ (µg/m ³)
0:57	37	43	100	0:56	3		280	53			M	0:00				0:00	26
1:57	30	41	100	1:56	32	41	120	153	26	33	130	1:00				1:00	799
2:57	18		160	2:56	34	44	140	253	23	36	150	2:00				2:00	500
3:57	25	36	160	3:56	39	48	140	353	33	41	150	3:00				3:00	429
4:57	9		130	4:56	33	41	180	453	30	40	170	4:00				4:00	
5:57	6		190	5:56	26	32	180	553	21	29	200	5:00	20		180	5:00	592
6:57	7		180	6:56	13		190	653	10		210	6:49	16		70	6:00	255
7:57	9		200	7:56	14		140	753	11		60	7:50	10		110	7:00	154
8:57	0			8:56	7		90	853	11		90	8:45	9		120	8:00	259
9:57	6		140	9:56	11		100	953	9		100	9:40	17		100	9:00	203
10:57	6		170	10:56	14		90	1053	13	18	130	10:40	12		100	10:00	115
11:57	8		160	11:56	15	20	110	1153	8		130	11:40	6		110	11:00	28
12:57	12	21	170	12:56	10	20	120	1253	13	21	130	12:40	12		150	12:00	37
13:57	17	23	170	13:56	13		140	1353	14		120	13:40	12		160	13:00	21
14:57	17		180	14:56	7	21	100	1453			M	14:43	15		130	14:00	21
15:57	21	25	170	15:56	8		140	1553	13		170	15:41	12		150	15:00	27
16:57	16		170	16:56	14		140	1653	14		120	16:49	17		140	16:00	37
17:57	16		180	17:56	14		130	1753	17		120	17:48	14		130	17:00	47
18:57	14		180	18:56	14		130	1853	15		130	18:50	10		130	18:00	45
19:57	8		170	19:56	11		130	1953	13		130	19:51	10		120	19:00	31
20:57	12		150	20:56	13		130	2053	13		130	20:46	9		130	20:00	30
21:57	10		160	21:56	10		130	2153	11		130	21:00				21:00	22
22:57	13		160	22:56	11		130	2253	11		140	22:00				22:00	23
23:57	14		160	23:56	8		130	2353	11		140	23:00				23:00	24

Wind data for KIPL, KNYL, and KNJK from the NCEI's QCLCD system. Wind data for Mexicali Airport (MMML) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees

²⁰ "Treatment of Data Influenced by Exceptional Events; Final Guidance", FR Vol. 81, No. 191, 68279, October 3, 2016

²¹ A wind advisory is issued when the following conditions are met for one (1) hour or longer: 1) sustained winds of 31 to 39 mph, and/or; 2) wind gusts of 46 to 57 mph for any duration. Source: NWS, 2016, <https://www.weather.gov/lwx/WarningsDefined#Wind%20Advisory>

²² Short Term Forecast National Weather Service Phoenix AZ 202 AM PST (302 AM MST), Monday, August 18, 2014.

TABLE 5-2
WIND SPEEDS AND PM₁₀ CONCENTRATIONS FOR NILAND AUGUST 18, 2014 ADDITIONAL SITES

SAN LUIS, MEXICO				BUTTERCUP RANGER STATION				CAHUILLA RANGER STATION				NILAND				NILAND	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	PM ₁₀ (µg/m ³)
0:00	9		150	0:09	24	35	85	0:10	9	10	102	0:00	9		135	0:00	26
1:00	22		99	1:09	22	40	118	1:10	23	37	97	1:00	17		128	1:00	799
2:00	22		127	2:09	21	34	152	2:10	21	35	126	2:00	14		137	2:00	500
3:00	26		144	3:09	22	41	149	3:10	27	34	133	3:00	18		148	3:00	429
4:00	17		150	4:09	8	33	162	4:10	12	40	158	4:00	15		147	4:00	
5:00	7		227	5:09	7	23	184	5:10	6	18	194	5:00	7		112	5:00	592
6:00	9		230	6:09	6	9	53	6:10	6	13	354	6:00	4		49	6:00	255
7:00	6		126	7:09	2	9	226	7:10	9	16	31	7:00	5		57	7:00	154
8:00	4		178	8:09	2	5	140	8:10	6	12	112	8:00	4		48	8:00	259
9:00	5		98	9:09	7	10	114	9:10	7	13	106	9:00	5		95	9:00	203
10:00	7		123	10:09	9	14	122	10:10	8	13	123	10:00	7		130	10:00	115
11:00	8		160	11:09	7	13	153	11:10	8	14	127	11:00	7		135	11:00	28
12:00	9		162	12:09	7	14	148	12:10	9	16	112	12:00	7		144	12:00	37
13:00	10		173	13:09	9	19	162	13:10	12	21	155	13:00	8		142	13:00	21
14:00	11		180	14:09	12	19	185	14:10	12	20	173	14:00	9		177	14:00	21
15:00	11		156	15:09	12	23	192	15:10	12	21	168	15:00	8		176	15:00	27
16:00	14		161	16:09	11	18	162	16:10	13	21	160	16:00	8		141	16:00	37
17:00	12		159	17:09	10	23	180	17:10	12	19	159	17:00	11		146	17:00	47
18:00	11		165	18:09	8	16	179	18:10	14	20	149	18:00	13		154	18:00	45
19:00	8		171	19:09	6	14	178	19:10	13	19	153	19:00	11		146	19:00	31
20:00	7		179	20:09	6	10	178	20:10	11	16	153	20:00	9		138	20:00	30
21:00	7		178	21:09	3	9	150	21:10	11	16	141	21:00	8		134	21:00	22
22:00	9		164	22:09	4	8	156	22:10	11	16	143	22:00	8		127	22:00	23
23:00	10		153	23:09	5	10	143	23:10	11	15	138	23:00	8		136	23:00	24

Wind data for San Luis Colorado, (MX), Buttercup Ranger Station (BTTC), and Cahuilla Ranger Station (QCAC1) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees

Figure 5-6 provides a general depiction of the resulting conditions that allowed for air quality in Imperial County to degrade and help explain the conditions that caused an exceedance at the Niland monitor.

As discussed above, the NWS identified an approaching low-pressure system from the northwest as early as August 15, 2014. By early morning August 17, 2014 it was still unclear to the NWS whether any thunderstorm activity would occur should the southwesterly flow aloft preceding the early season upper low moving south down the California coast dominate. By the afternoon of August 17, 2014, the NWS office in Phoenix identified the potential of afternoon and evening monsoonal thunderstorms in Arizona, excluding southeast California, when noted increased moisture from the south developed. However, by the evening hours of August 17, 2014 the NWS identified strong winds ahead of thunderstorms moving west from central Arizona. By the early morning hours of August 18, 2014 both NWS offices in San Diego and Phoenix agreed, gusty east

to southeast thunderstorm outflow winds were affecting Southeast California and Imperial County. Overall, several mesoscale convective systems over southwest Arizona and northern Mexico produced outflow boundaries that brought an influx of low-level moisture into the desert and mountains from the south and southeast.

Locally, as demonstrated above in **Tables 5-1 through 5-2**, stations to the east and southeast of Imperial County in Mexico and southwestern Arizona measured winds above 25 mph. Elevated winds at these sites are coincident with measured elevated concentrations at the Niland monitor.

FIGURE 5-6
EXCEEDANCE FACTORS FOR AUGUST 18, 2014

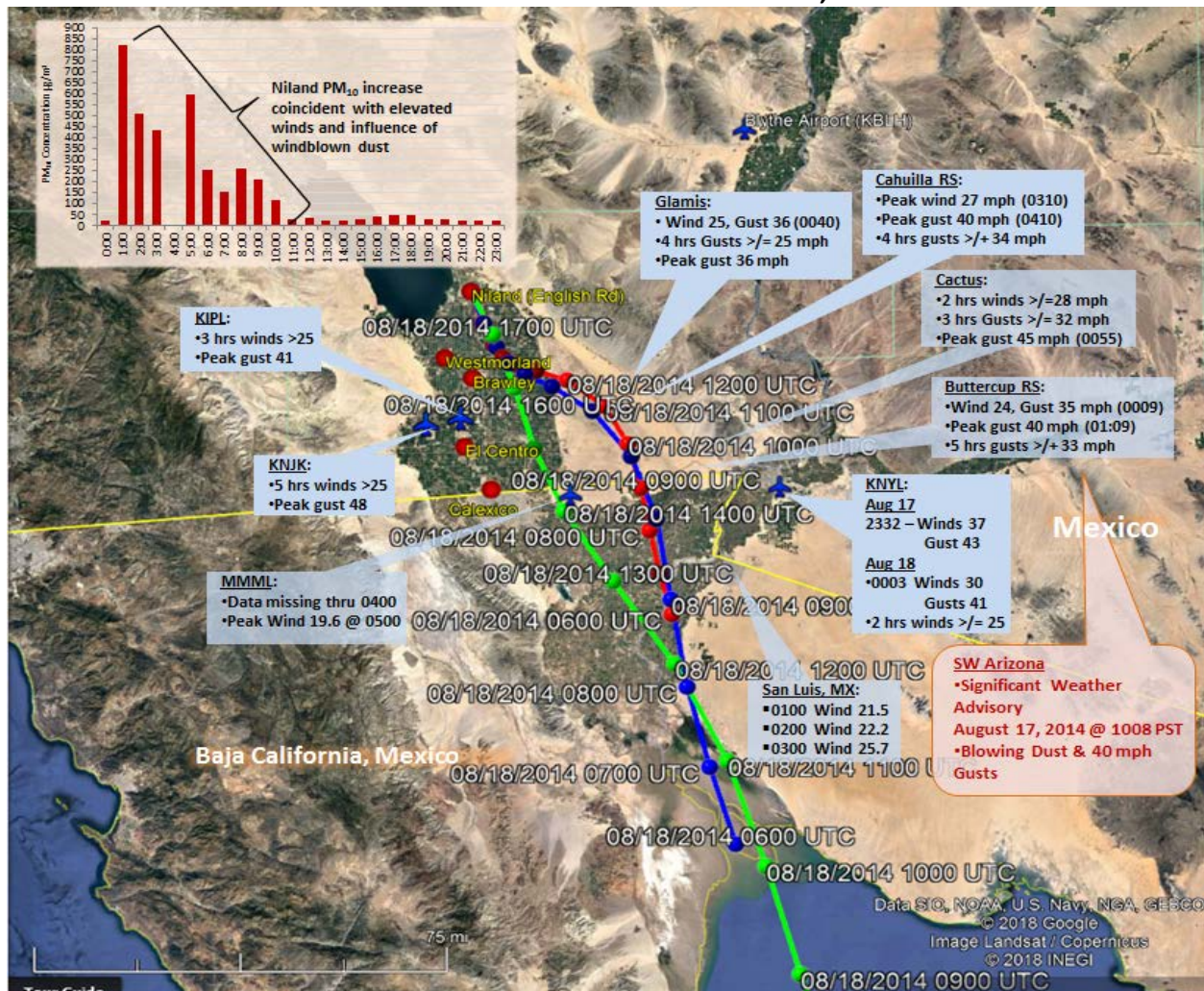


Fig 5-6: A time sequence illustrates key moments during the event day, including wind speeds at various upstream wind sites. The 12-hour HYSPLIT trajectory illustrates the predominant airflow coming from Mexico. Gusty outflow winds transported dust from natural open desert areas surrounding Imperial County and as far away as Mexico and Arizona. The trajectory illustrates airflow up to the 10-meter (red), 100-meter (blue), and 500-meter (green) levels. Generated through NOAA's Air Resources Laboratory. Google Earth base map

Figures 5-7 through 5-9 demonstrate the temporal relationship between the high winds and the transported windblown dust affecting the Niland monitor. While the lower wind speeds at Niland allowed for the deposition of particulates onto the Niland monitor, the greatest PM₁₀ concentrations generally occurred during the highest winds and gusts measured at upstream stations. **Appendix C** contains additional graphs illustrating the relationship between the high PM₁₀ concentrations and increased wind speeds from other monitoring sites within Imperial and Riverside counties on August 18, 2014.

FIGURE 5-7
NILAND PM₁₀ CONCENTRATIONS AND WIND SPEED CORRELATION

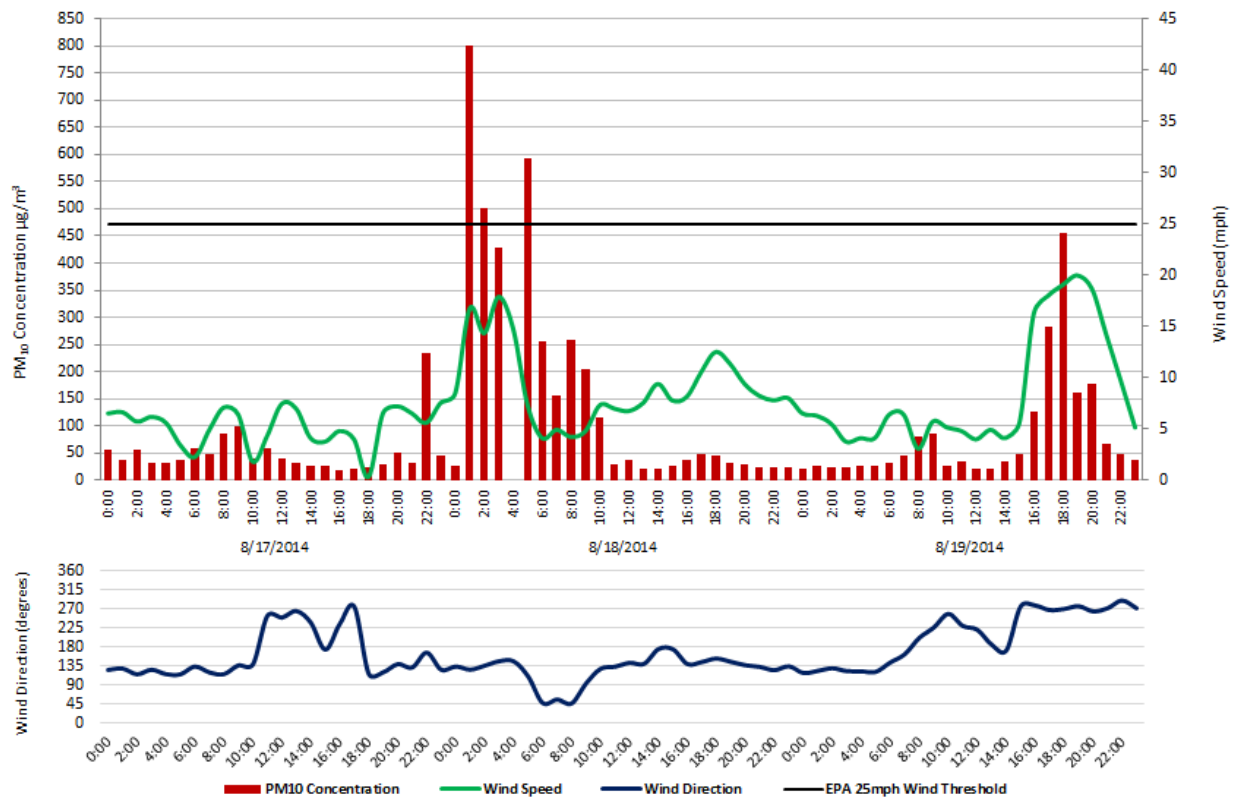


Fig 5-7: Niland measured the greatest concentrations during the period of highest wind speeds. Air quality data from the EPA's AQS data bank. Wind data from the NCE's QCLCD system and the University of Utah's MesoWest

FIGURE 5-8
NILAND PM₁₀ CONCENTRATIONS AND WIND SPEED CORRELATION

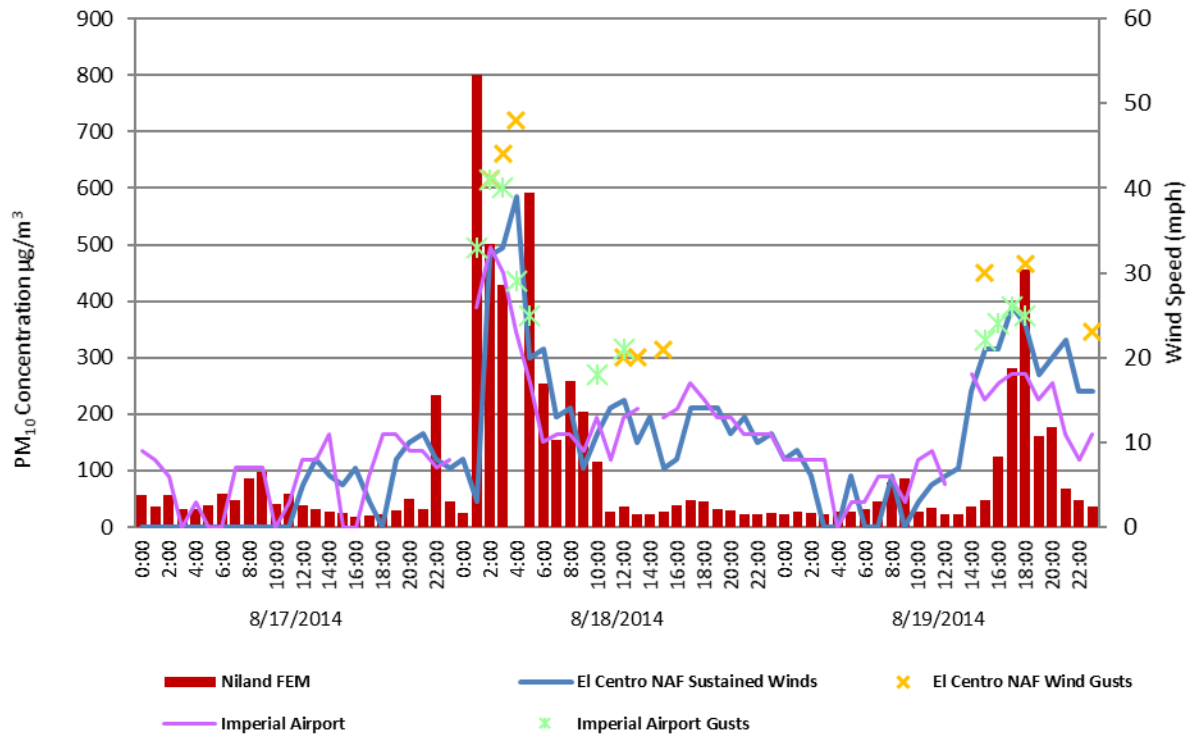


Fig 5-8: Niland measured the greatest concentrations during the period of highest wind speeds. Air quality data from the EPA's AQS data bank. Wind data from the NCE's QCLCD system and the University of Utah's MesoWest

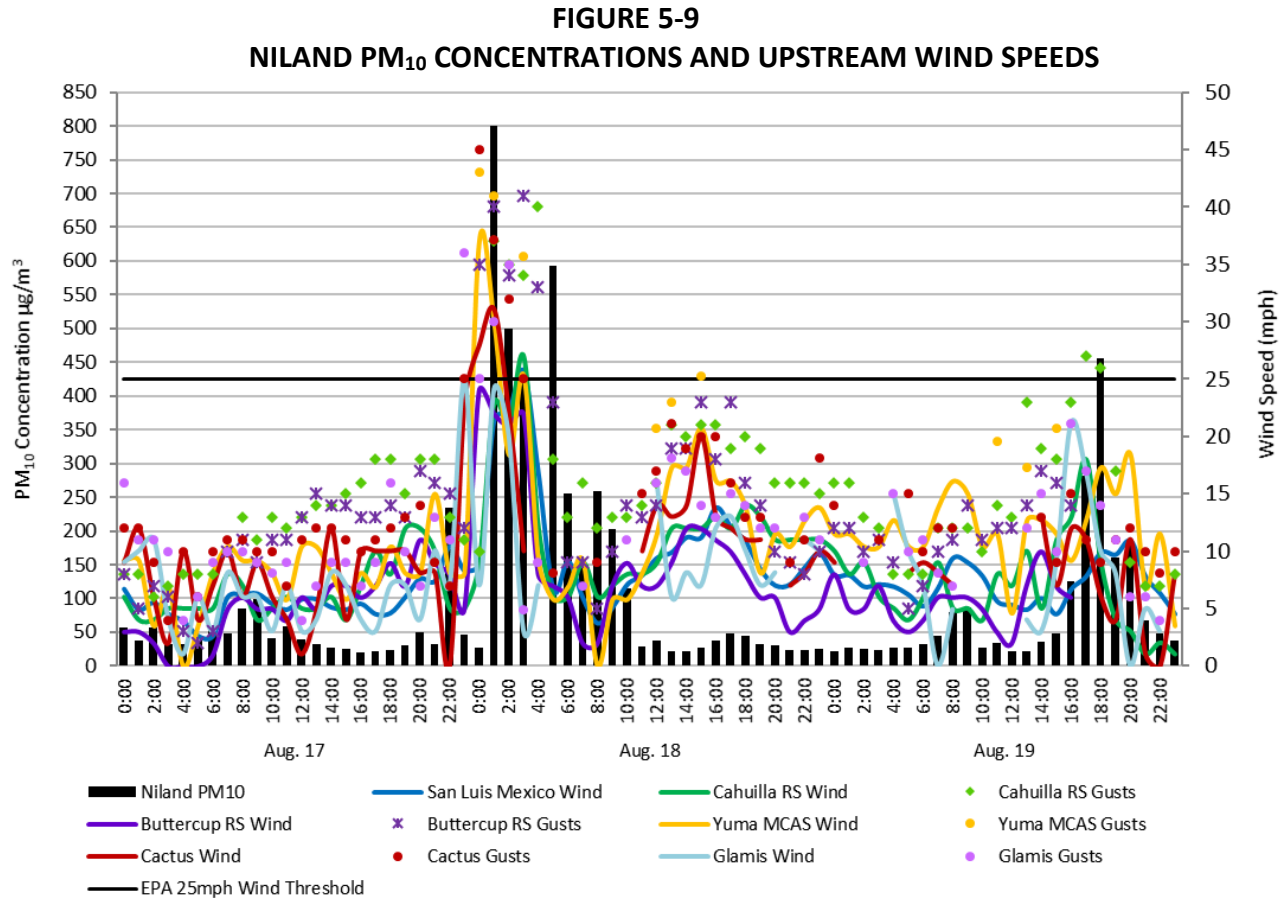


Fig 5-9: Niland measured elevated concentrations coincident with the highest wind speeds. Air quality data from the EPA's AQS data bank. Wind data from the NCE's QCLCD system and the University of Utah's MesoWest

Figure 5-10 illustrates the measured PM₁₀ concentrations relative to the observed visibility at various airports. Reduced visibility is coincident with elevated concentrations. The Imperial County Airport, closest to Niland, the Naval Air Facility in El Centro, the Palm Springs International Airport and the Yuma MCAS all reported reduced visibility.

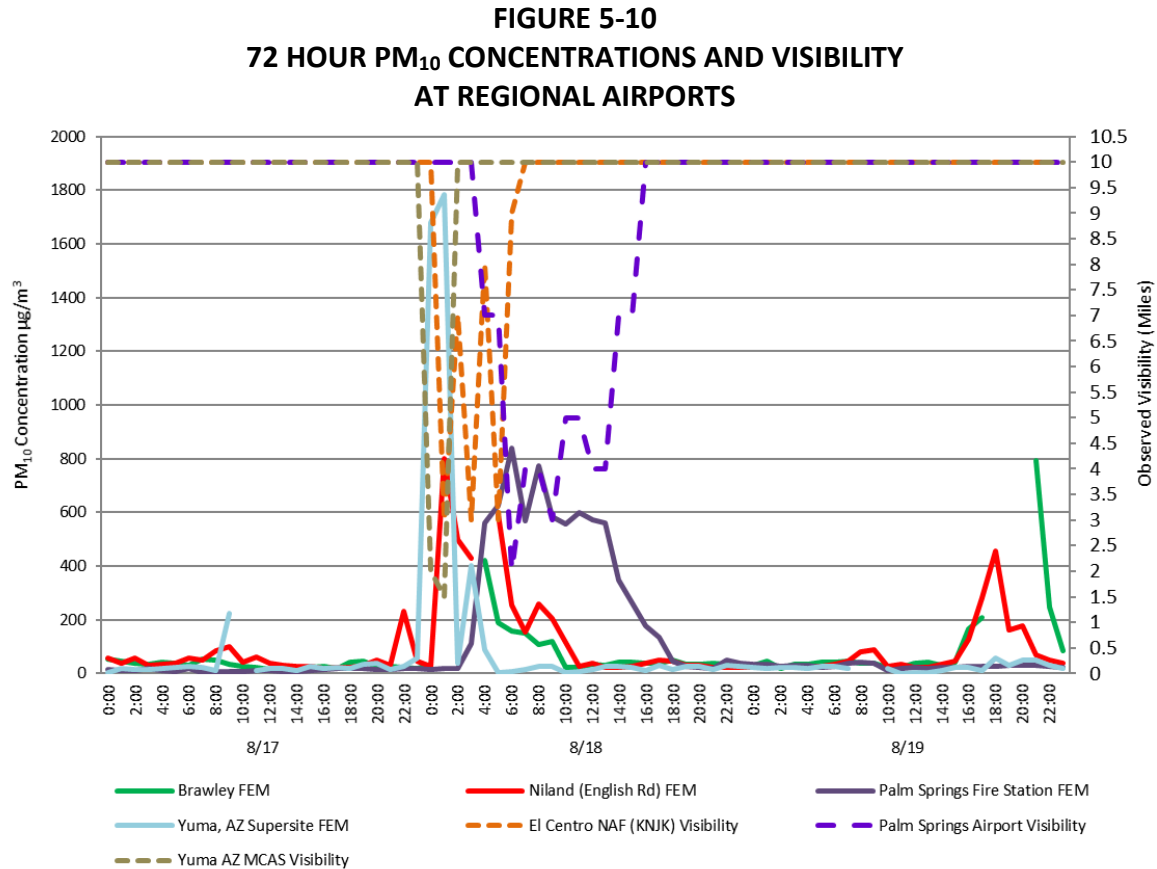


Fig 5-10: Severely limited visibility at airports within Riverside County, Imperial County and Yuma, Arizona underscores the regional impact of the wind event. Wind and air quality data from the EPA's AQS data bank

As discussed above, the NWS office in Phoenix issued a short term forecast and hazardous weather outlook that advised of gusty east to southeast winds leading to patchy blowing dust and sand.²³ A useful measurement of the degradation of air quality is the Air Quality Index (AQI).²⁴ Air quality alerts issued for the Niland area advised of unhealthy conditions for sensitive groups such as the elderly and children (**Appendix A**).

Figure 5-11 provides the resultant AQI for August 18, 2014. As thunderstorm outflow winds reached Imperial County, the level of reduced air quality became evident when the AQI level

²³ Short Term Forecast 202 AM PST (302 AM MST) and Hazardous Weather Outlook 231 AM PST (321 AM MST), National Weather Service Phoenix AZ, Monday, August 18, 2014.

²⁴ The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health affects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country. Source: <https://airnow.gov/index.cfm?action=aqibasics.aqi>

changed from “Green” of Good level to “Orange” or Unhealthy for Sensitive Receptors. The lower air quality affirms that on August 18, 2014 strong gusty southeasterly winds transported windblown dust into Imperial County affecting air quality.

FIGURE 5-11
AIR QUALITY INDEX FOR NILAND ON AUGUST 18, 2014

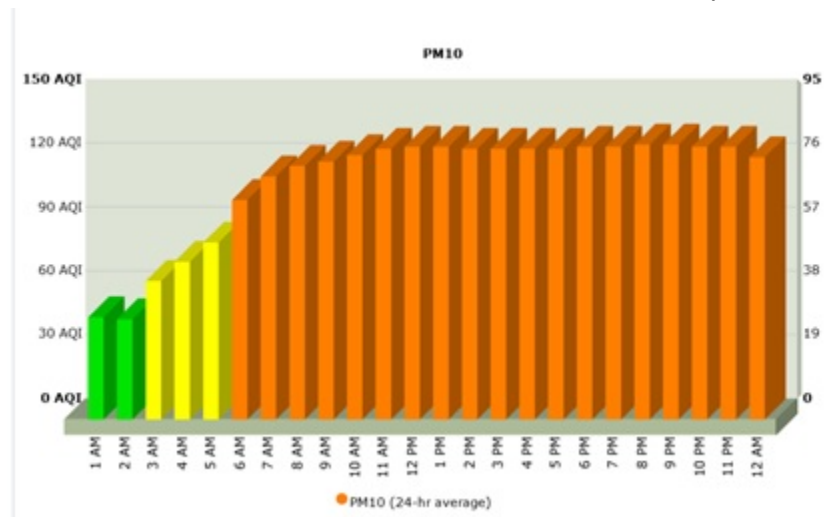


Fig 5-11: Demonstrates that air quality in Imperial County reduced air quality when thunderstorm outflow winds blew into Imperial County transporting windblown dust on August 18, 2014

V.2 Summary

The preceding discussion, graphs, figures, and tables provide wind direction, speed and concentration data illustrating the spatial and temporal effects of the strong thunderstorm outflow winds resulting from a monsoonal air mass that surged into southeastern California and southwestern Arizona. The information provides a clear causal relationship between the transported windblown dust and the PM₁₀ exceedance measured at the Niland monitor on August 18, 2014. Furthermore, the NWS notices and the air quality index illustrate the affect upon air quality within the region extending from the northwestern section of Mexico, all of Imperial County and the southeastern portion of Yuma County Arizona. Large amounts of coarse particles (dust) and PM₁₀ transported by strong easterly to southerly winds into the lower atmosphere caused a change in the air quality conditions within Imperial County. The transported windblown dust originated from as far as the natural open deserts and urban/rural areas located within northern Mexico, southwestern Arizona, and a portion of Imperial County (all part of the Sonoran Desert). Combined, the information demonstrates that the elevated PM₁₀ concentrations measured on August 18, 2014 coincided with high wind speeds and that gusty southeasterly winds affected the southern portion of Riverside County, southeastern San Diego County, all of Imperial County, and parts of Arizona.

FIGURE 5-12
AUGUST 18, 2014 WIND EVENT TAKEAWAY POINTS

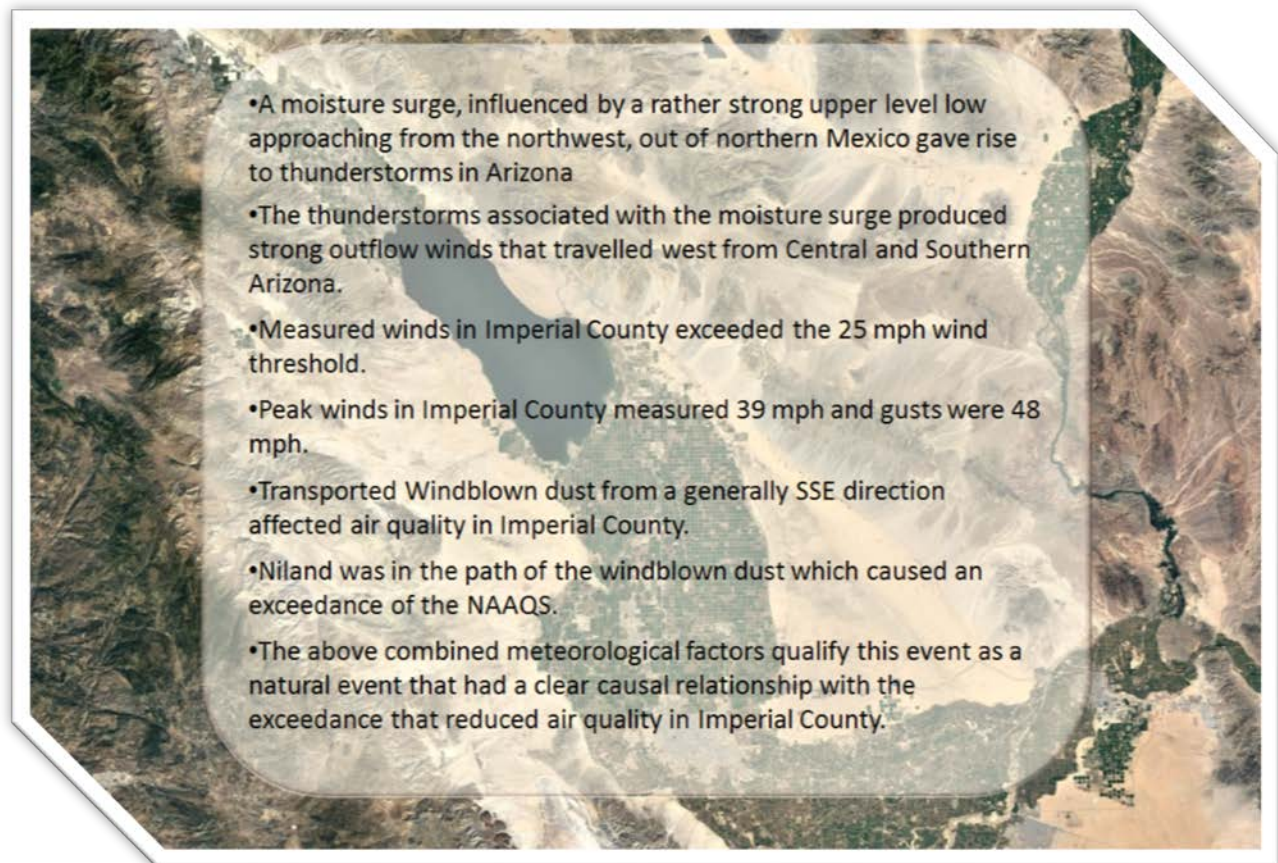


Fig 5-12: Illustrates the factors that qualify the August 18, 2014 natural event which affected air quality as an Exceptional Event

VI Conclusions

The PM₁₀ exceedance that occurred on August 18, 2014, satisfies the criteria of the EER, which states that in order to justify the exclusion of air quality monitoring data evidence must be provided for the following elements:

TABLE 6-1 TECHNICAL ELEMENTS CHECKLIST		
EXCEPTIONAL EVENT DEMONSTRATION FOR HIGH WIND DUST EVENT (PM ₁₀)		DOCUMENT SECTION
1	A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s)	6-33
2	A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation	47-60
3	Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement at paragraph (c)(3)(iv)(B) of this section	34-38
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	39-46
5	A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event	6-60

VI.1 Affects Air Quality

The preamble to the revised EER states that an event has affected air quality if the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation. Given the information presented in this demonstration, particularly Section V, we can reasonably conclude that there exists a clear causal relationship between the monitored exceedance and the August 18, 2014 event, which changed or affected air quality in Imperial County.

VI.2 Not Reasonably Controllable or Preventable

Section 50.1(j) of 40 CFR Part 50 defines an exceptional event as an event that must be “not reasonably controllable or preventable” (nRCP). The revised preamble explains that the nRCP has two prongs, not reasonably preventable and not reasonably controllable. A natural wind event, which transports dust from natural open deserts, meets the nRCP, when sources are controlled by BACM and when human activity plays little to no direct causal role. This demonstration provides evidence that despite BACM in place within Imperial County, strong

gusty winds overwhelmed all BACM controls where human activity played little to no direct causal role. The PM₁₀ exceedance measured at the Niland monitor caused by naturally occurring strong gusty southeasterly winds transported windblown dust into Imperial County and other parts of southern California from areas located within the Sonoran Desert in Arizona and Mexico to the south and southeast of Imperial County. These facts provide strong evidence that the PM₁₀ exceedance at Niland on August 18, 2014, were not reasonably controllable or preventable.

VI.3 Natural Event

The revised preamble to the EER clarifies that a “Natural Event” (50.1(k) of 40 CFR Part 50), which may recur at the same location, is an event where human activity plays little or no direct causal role. The criteria that human activity played little or no direct causal role occurs when the event, along with its resulting emissions, are solely from natural sources or where all significant anthropogenic sources of windblown dust have been reasonably controlled. As discussed within this demonstration, windblown dust anthropogenic sources reasonably controlled with BACM in and around Niland on August 18, 2014 meet the criteria that human activity played little or no direct causal role therefore, the event qualifies as a natural event.

VI.4 Clear Causal Relationship

The time series plots of PM₁₀ concentrations at Niland during different days, and the comparative analysis of different monitors in Imperial, Riverside and Yuma counties demonstrates a consistency of elevated gusty southeasterly winds and concentrations of PM₁₀ on August 18, 2014 (Section V). In addition, these time series plots and graphs demonstrate that the high PM₁₀ concentrations and the gusty southeasterly winds were an event that was widespread, regional and not preventable. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty southeasterly winds. Days immediately before and after the high wind event PM₁₀ concentrations were well below the NAAQS. Overall, the demonstration provides evidence of the strong correlation between the natural event and the windblown dust emissions to the exceedance on August 18, 2014.

VI.5 Historical Concentrations

The historical annual and seasonal 24-hr average PM₁₀ concentrations measured at the Niland monitor were historically unusual compared to a multi-year data set (Section III).

Appendix A: Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

This section contains issued notices by the NWS and Imperial County pertinent to the August 18, 2014 event. Along with NWS notices, this Appendix contains any issued air quality alerts. Air quality alerts advise sensitive receptors of potentially unhealthy conditions in Imperial County resulting from a natural event. On August 18, 2014, the data illustrates a region-wide increase in wind speeds and wind gusts coincident with the arrival of dust and high PM₁₀ concentrations in

Imperial County.

Appendix B: Meteorological Data.

This Appendix contains the time series plots, graphs, wind roses, etc. for selected monitors in Imperial, Riverside and Yuma counties along with other pertinent graphs, time series plots for other areas if applicable. These plots, graphs and tables demonstrate the regional impact of the wind event.

Appendix C: Correlated PM₁₀ Concentrations and Winds.

This Appendix contains the graphs depicting the correlations between PM₁₀ Concentrations and elevated wind speeds for selected monitors within Imperial, Riverside, San Diego, and Yuma counties if applicable. Other areas are also included if applicable such as Mexico. These graphs demonstrate the region wide impact of the wind event.

Appendix D: Regulation VIII – Fugitive Dust Rule.

This Appendix contains a description of the compilation of the BACM adopted by the ICAPCD and approved by the USEPA. Seven rules numbered 800 through 806 comprise the set of Regulation VIII Fugitive Dust Rules.